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DINOSAURS!

•DISCOVER THE GIANTS OF THE PREHISTORIC WORLD•

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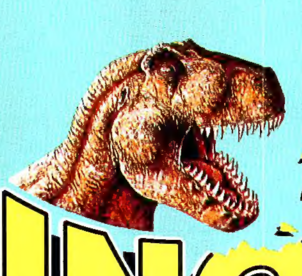

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •

IDENTIKIT

Find out how these three dinosaurs lived

HETERODONTOSAURUS 529

PACHYCEPHALOSAURUS 532

AVIMIMUS 533

DINOSAUR WORLD

Dive into the Jurassic undergrowth and discover

A PLANT-EATER'S PARADISE 534

SPOTTER'S GUIDE

Let battle commence!

MEAT-EATER VERSUS PLANT-EATER 542

TIME DETECTIVE

A tasty lizard or a tough pterosaur? Here are some strange

DINOSAUR DIETS 544

HISTORY IN PICTURES

The tale of JOHN OSTROM'S 'TERRIBLE CLAW' 548

A to Z

Interesting dinosaurs beginning with I: *Iguanodon* to *Itemirus* 552

ASK THE EXPERT

Put your questions to world-famous dinosaur expert Dr David Norman BACK COVER

PLUS

GIANTS OF THE PAST

Five *Heterodontosaurus* run for their lives 538

3-D Gallery

Watch an Australian dinosaur come to life in fabulous 3-D 540

DINO Fact File

Keep expanding your dinosaur know-how 550

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HETERODONTOSAURUS

Little *Heterodontosaurus* had three different sorts of teeth where most dinosaurs only had one kind.

Heterodontosaurus was about the size of a wallaby. When chased by predators such as *Coelophysis,* it sprinted away on its hind legs with its tail held straight out behind. A criss-cross of bones along its spine strengthened the lower half of its body and stiffened its tail.

BIG CHOICE

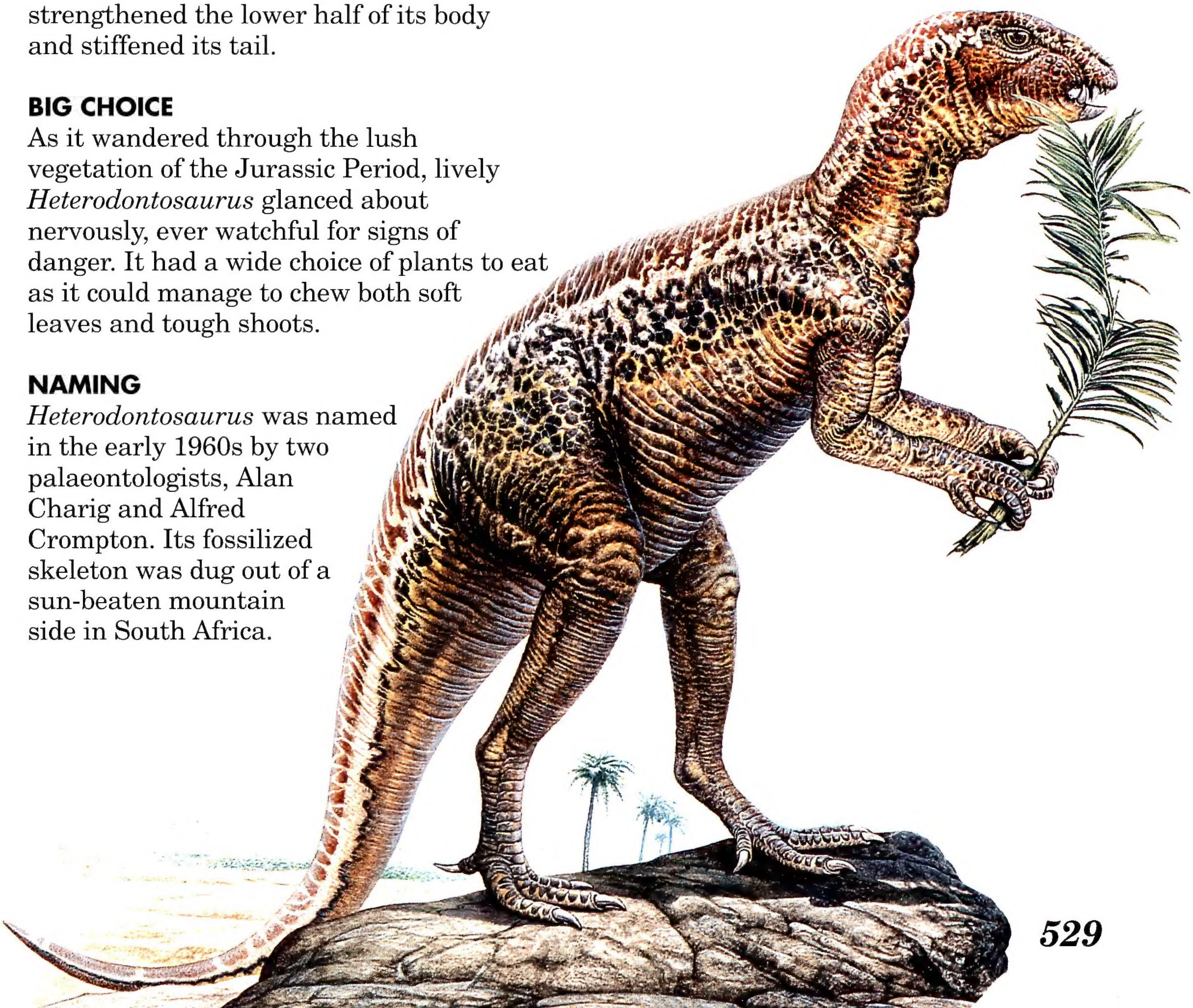
As it wandered through the lush vegetation of the Jurassic Period, lively *Heterodontosaurus* glanced about nervously, ever watchful for signs of danger. It had a wide choice of plants to eat as it could manage to chew both soft leaves and tough shoots.

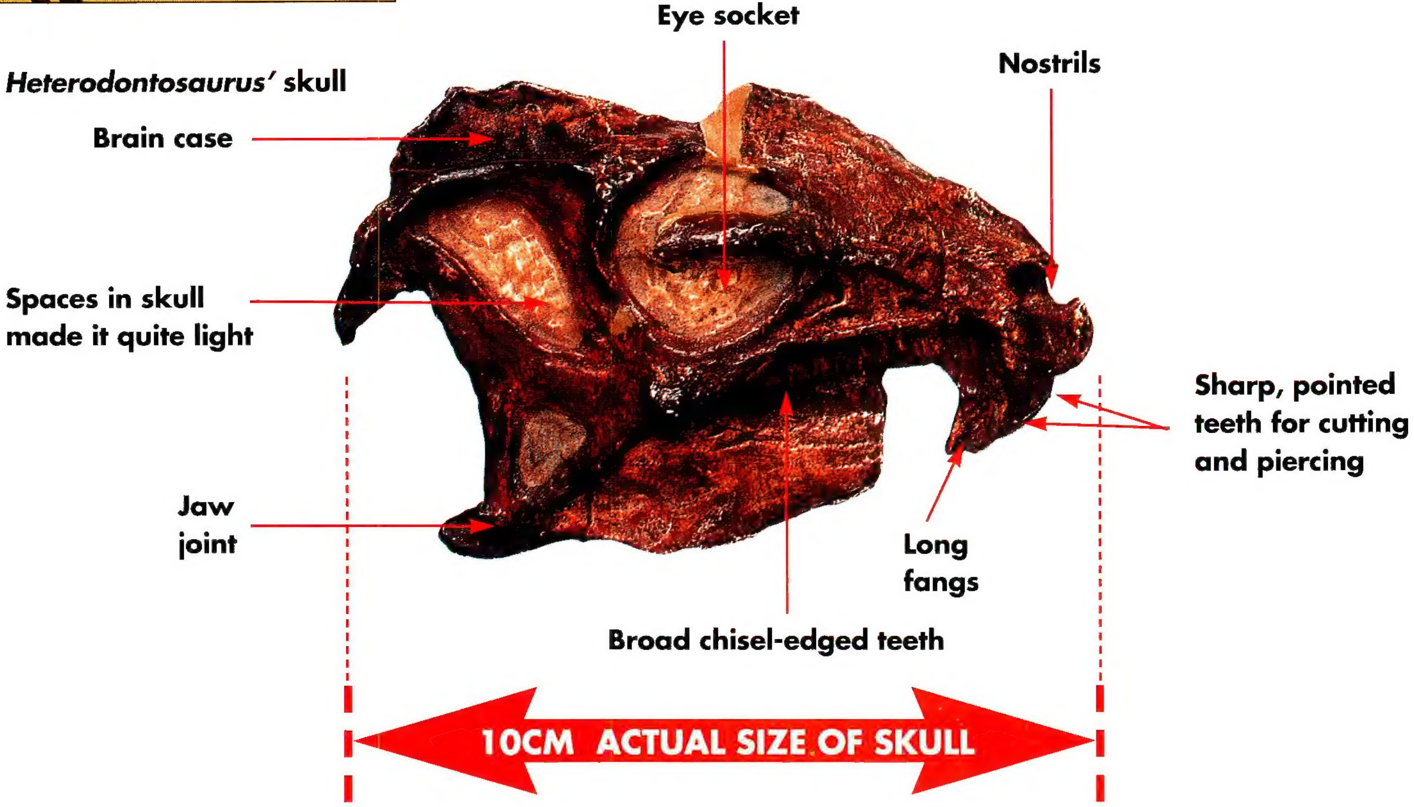
NAMING

Heterodontosaurus was named in the early 1960s by two palaeontologists, Alan Charig and Alfred Crompton. Its fossilized skeleton was dug out of a sun-beaten mountain side in South Africa.

LIGHT FOOTED

When faced with danger, *Heterodontosaurus* could run to safety. It had the long, slender feet of a fast, sprinting dinosaur. Its legs were not built to carry much weight. Three clawed toes pointed forwards and a small, fourth toe pointed backwards. This helped *Heterodontosaurus* to balance when it stood quietly to feed.

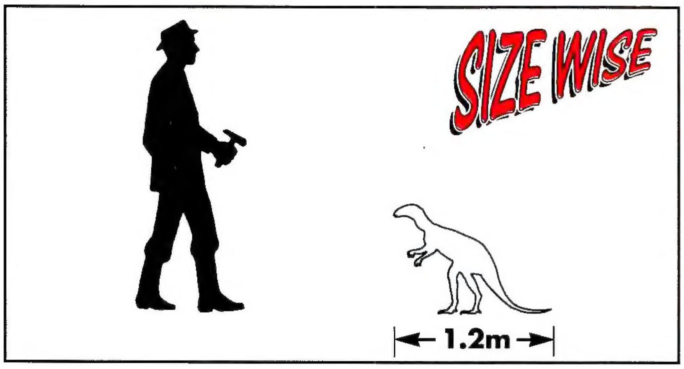



Heterodontosaurus' skull
Brain case
Eye socket
Nostrils
Spaces in skull made it quite light
Sharp, pointed teeth for cutting and piercing
Jaw joint
Long fangs
Broad chisel-edged teeth
10CM ACTUAL SIZE OF SKULL

Look at this tiny *Heterodontosaurus* skull. When it was covered in flesh it would have been a bit bigger, but it was still quite small and light.

TOOL BOX TEETH

Mechanics know how important it is to have the right tools for a job; they help them to work well. *Heterodontosaurus* carried its own special set of tools in its jaws. At the front were sharp, pointed teeth for cutting and slicing. Behind these were a pair of long fangs. They were strong enough to puncture tough stems so that they were broken off more easily and may also have been used as weapons. At the back, *Heterodontosaurus* completed its tool box with a set of broad, chisel-edged teeth. These were the grinding tools that broke down the plant food very finely.



FANGLESS FEMALES

After studying this dinosaur for years, scientists now believe that female *Heterodontosaurus* probably did not have fangs like the male. So it is possible that *Heterodontosaurus* fangs had more uses than just eating food and biting enemies. These sharp fangs may also have been an excellent way of telling male and female *Heterodontosaurus* apart.

MONSTER FACTS

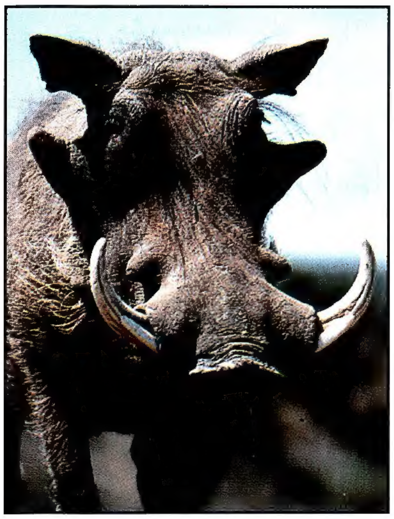
- **NAME:** *Heterodontosaurus* (het-er-oh-dont-oh-saw-rus) means 'reptile with different teeth'
- **SIZE:** 1.2m long
- **FOOD:** plants
- **LIVED:** about 190 million years ago during the Early Jurassic Period in southern Africa

WARTHOGS AND WILD PIGS

Today, animals like warthogs and wild pigs use their tusks for digging and scaring away their enemies. The male African warthog has long curling tusks which it uses to attract mates and battle with rivals. A male *Heterodontosaurus* probably used its fangs as a defensive weapon when cornered by a predator. At other times its toothy jaws may have attracted females.

Is it true that some dinosaurs had a bony corset ?

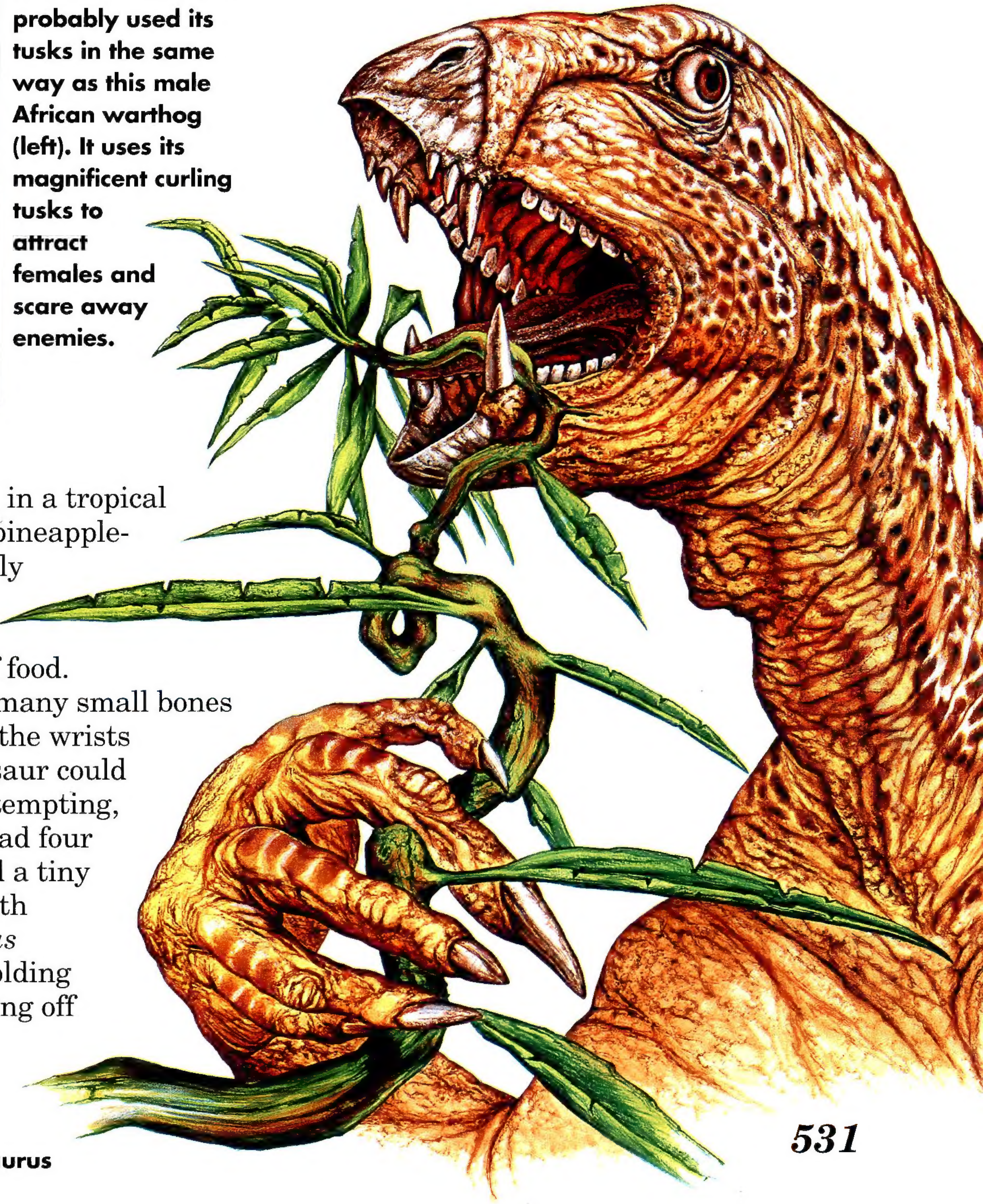
Heterodontosaurus, like other ornithopods, needed some strong support for its back and tail. Instead of heavy muscles, which would have weighed it down, *Heterodontosaurus* had long bony rods which stretched across its backbones in a criss-cross pattern. This made a strong trellis-work of bone, which worked like a stiff Victorian corset to support the dinosaur's back.



***Heterodontosaurus* probably used its tusks in the same way as this male African warthog (left). It uses its magnificent curling tusks to attract females and scare away enemies.**

FLEXIBLE WRISTS

Heterodontosaurus lived in a tropical climate. Tree ferns and pineapple-shaped cycads grew easily and provided plant-eating dinosaurs with plenty of food. *Heterodontosaurus* had many small bones in its wrists. This made the wrists flexible so that the dinosaur could grasp and pull at these tempting, juicy plants. Its hands had four long, elegant fingers and a tiny fifth finger, all tipped with claws. *Heterodontosaurus* grasped shoots easily, holding on to branches and tearing off leaves with its sharp front teeth.

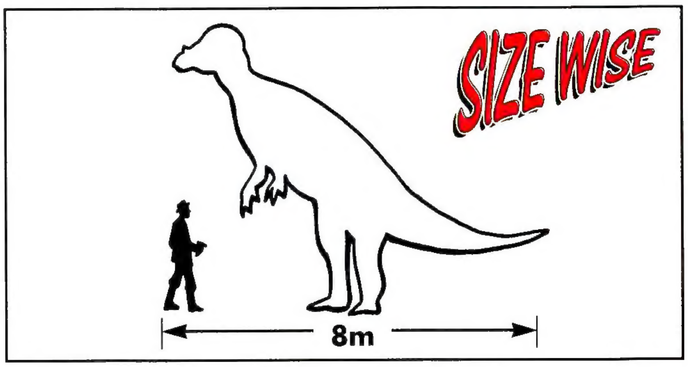


Heterodontosaurus

PACHYCEPHALOSAURUS

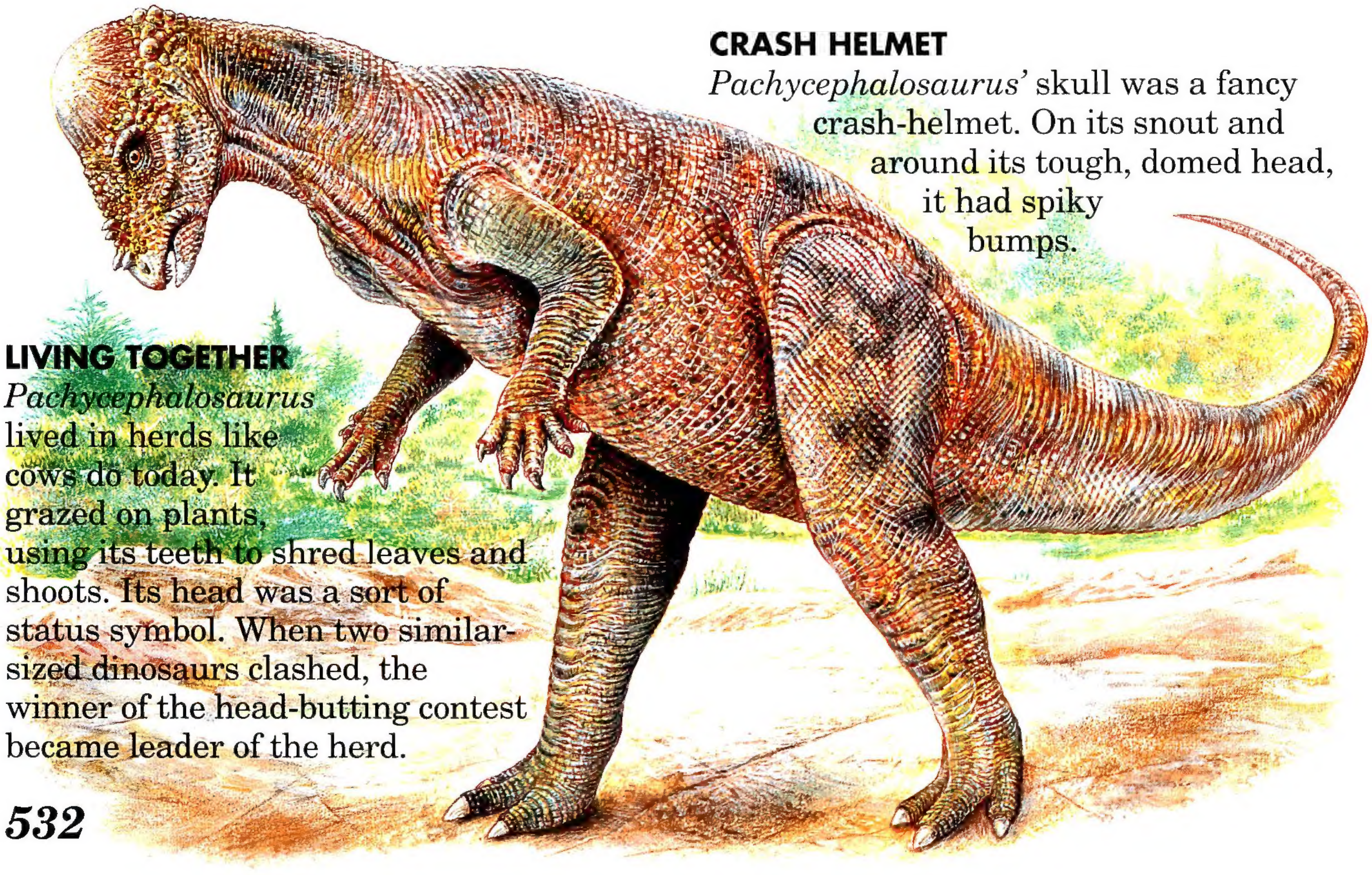
Pachycephalosaurus used its strange, dome-shaped skull like an American footballer's helmet.

The largest *Pachycephalosaurus* found so far was as long as the distance between two football posts. When it bent its head down, the top of *Pachycephalosaurus'* thick, bony skull pointed forwards. With the rest of its body lined up straight behind like a battering ram, the dinosaur charged at a rival. When their heads smashed violently into one another, bone as thick as two bricks banged together, but also protected the dinosaurs' brains from injury.



MONSTER FACTS

- **NAME:** *Pachycephalosaurus* (pak-ee-sef-al-oh-saw-rus) means 'thick headed reptile'
- **SIZE:** up to 8m long
- **FOOD:** leaves, fruit and possibly insects
- **LIVED:** about 70 million years ago in the Cretaceous in North America



CRASH HELMET

Pachycephalosaurus' skull was a fancy crash-helmet. On its snout and around its tough, domed head, it had spiky bumps.

LIVING TOGETHER

Pachycephalosaurus lived in herds like cows do today. It grazed on plants, using its teeth to shred leaves and shoots. Its head was a sort of status symbol. When two similar-sized dinosaurs clashed, the winner of the head-butting contest became leader of the herd.

AVIMIMUS

Some scientists believe that bird-like *Avimimus* had wing feathers.

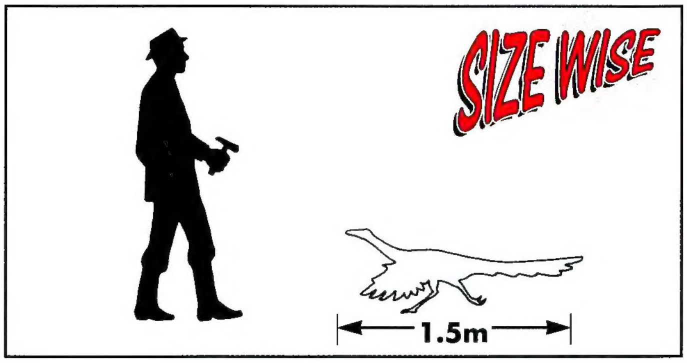
Like the ground-dwelling bird, the American road-runner, *Avimimus* probably sprinted across open plains chasing after flying insects. No one knows for sure whether *Avimimus* was a feathered dinosaur. But it did have a bony ridge on the front part of its arm. Birds have similar sorts of bony ridges where feathers are attached. Without more evidence, it is impossible to know for certain if *Avimimus* could flutter through the air like a bird.

FAST RUNNER

Avimimus was as long as an average-sized dog and about knee-high to an adult human. Its lightweight body and slender legs made *Avimimus* a fast sprinter. As it ran, it held out its long tail to balance the front part of its body.

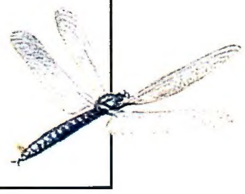
FLY-CATCHER

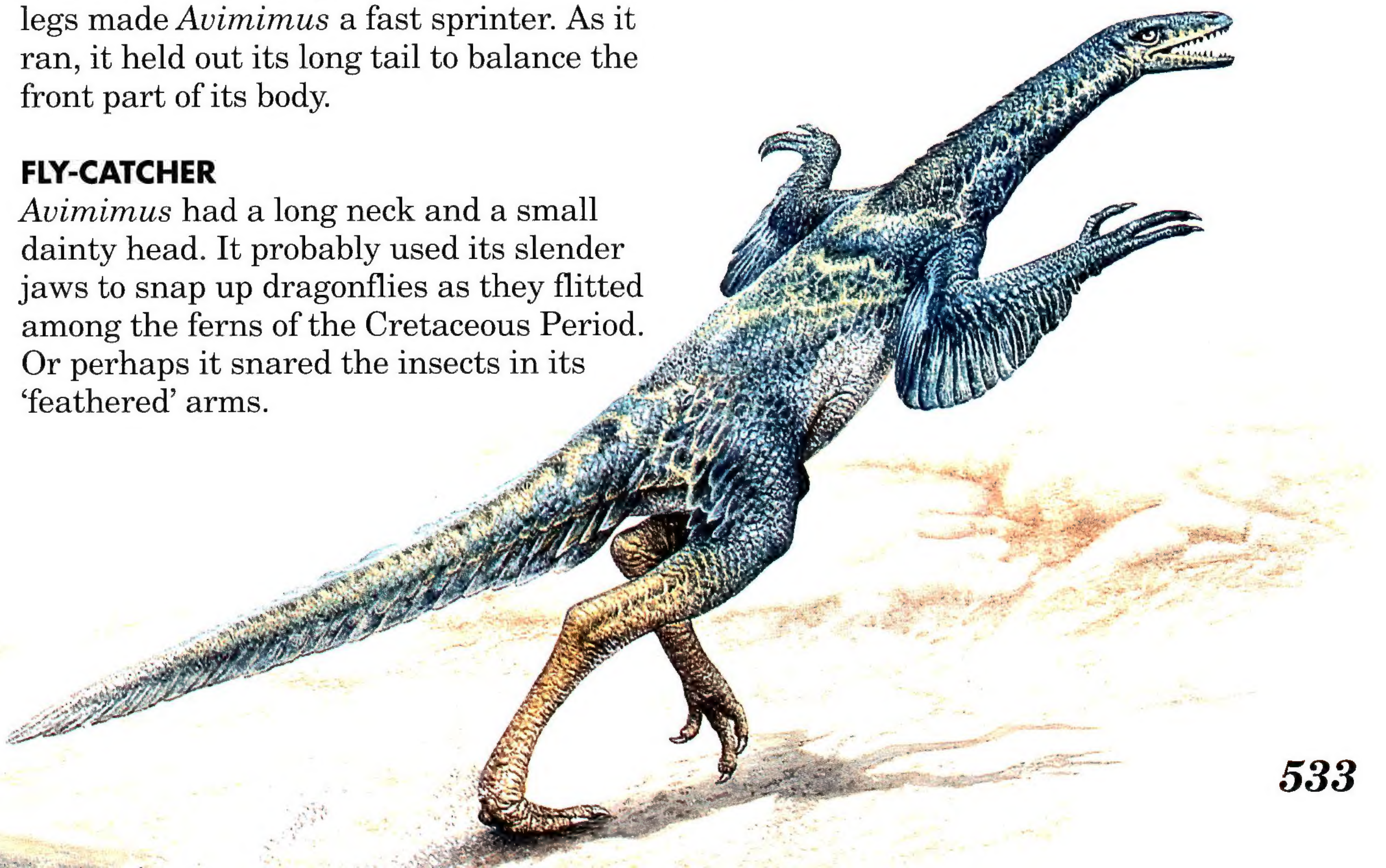
Avimimus had a long neck and a small dainty head. It probably used its slender jaws to snap up dragonflies as they flitted among the ferns of the Cretaceous Period. Or perhaps it snared the insects in its 'feathered' arms.



MONSTER FACTS

- **NAME:** *Avimimus* (av-i-mime-us) means 'bird mimic'
- **SIZE:** 1.5m long
- **FOOD:** insects
- **LIVED:** about 75 million years ago in the Late Cretaceous Period in southern Mongolia





A plant-eater's paradise

Which plants were the favourite food of the giant sauropods of the Jurassic?

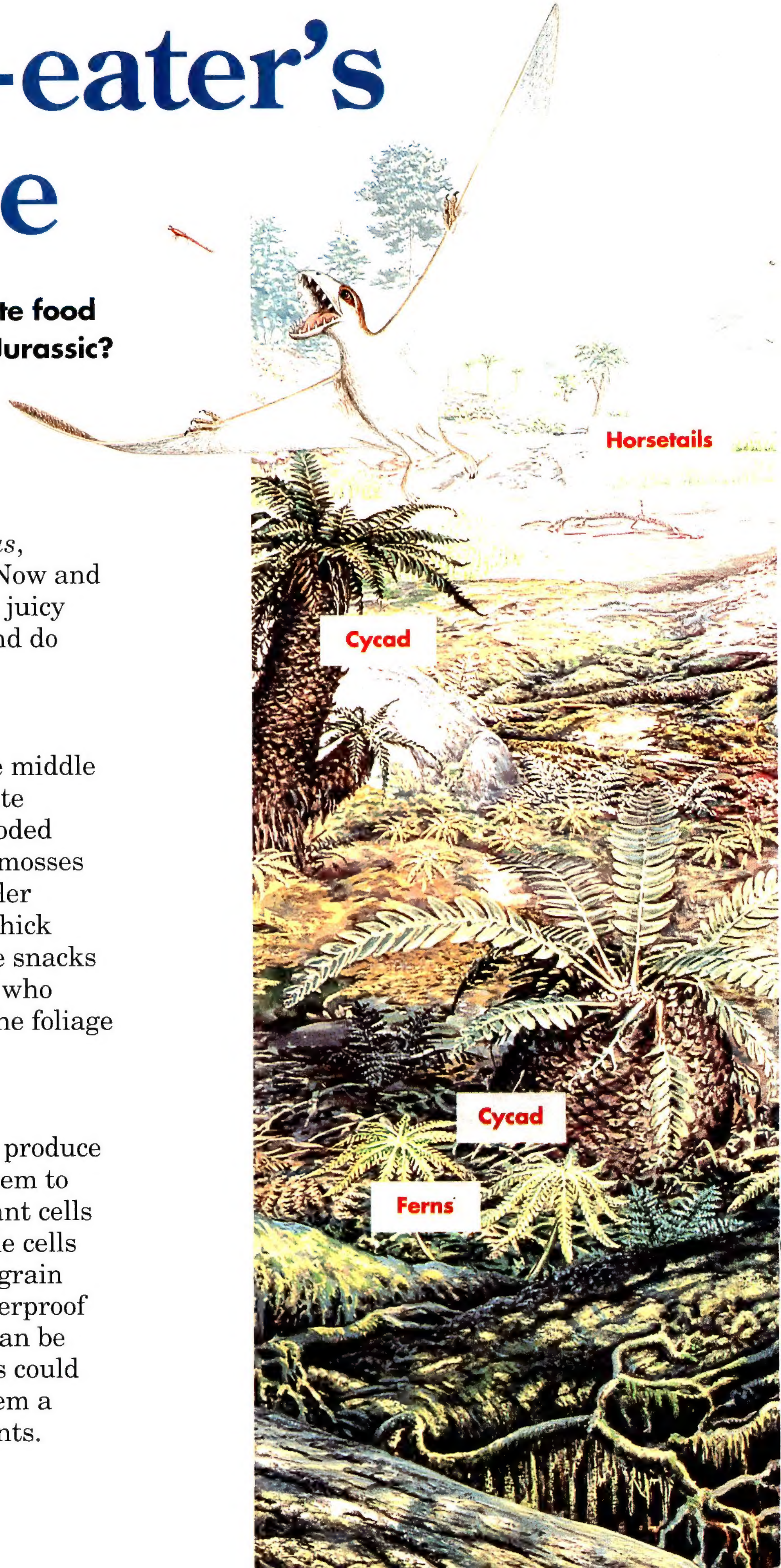
Imagine a great herd of massive plant-eating dinosaurs, such as long-necked *Brachiosaurus*, wandering across the landscape. Now and again, they stop to munch on soft, juicy plants. What were these plants and do they still survive today?

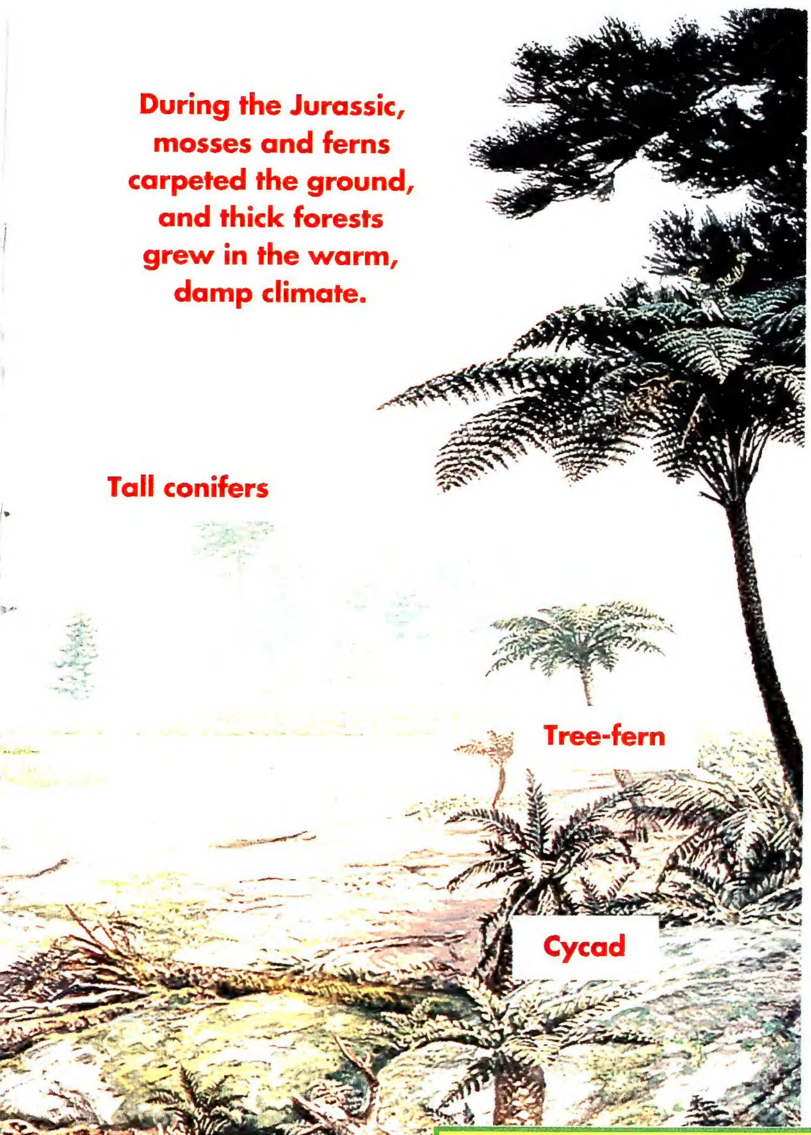
WARMING UP

During the Jurassic Period, in the middle of the Age of Dinosaurs, the climate became warm and moist. Seas flooded much of the land. Rich carpets of mosses and ferns covered the ground. Taller horsetails and tree-ferns formed thick forests. These ancient plants were snacks for the great sauropod dinosaurs, who browsed among them, raking in the foliage with their peg-like teeth.

INVENTING POLLEN

At this time, plants first began to produce pollen and seeds. These helped them to breed better. Before this, male plant cells had to swim in water to the female cells like miniature tadpoles. A pollen grain contains a male cell in a tiny, waterproof package. Like a speck of dust, it can be blown for miles. At last plant cells could travel across land, which gave them a better chance of making baby plants.




During the Jurassic, mosses and ferns carpeted the ground, and thick forests grew in the warm, damp climate.
Tall conifers
Tree-fern
Cycad

INVENTING SEEDS

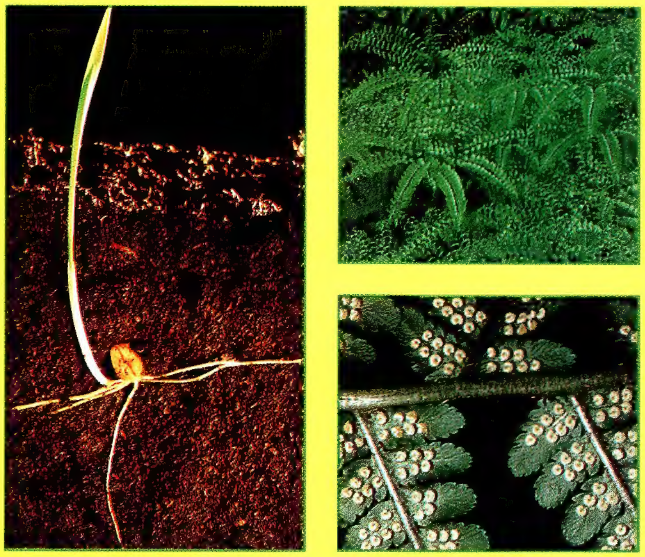
A seed is a baby plant with its own food store. If it is in the right place, a seed can make a good start in life, and grow using its own food supply. The spores (reproductive cells) of simpler, more ancient plants could not do this. They did not have food stores, so they had less chance of survival.

THE FIRST SEEDS

The first plants to have seeds were gymnosperms, or 'naked-seeds'. They appeared just before the dinosaurs and they included the seed-ferns, cycads, ginkgos and conifers.

SEED PIONEERS

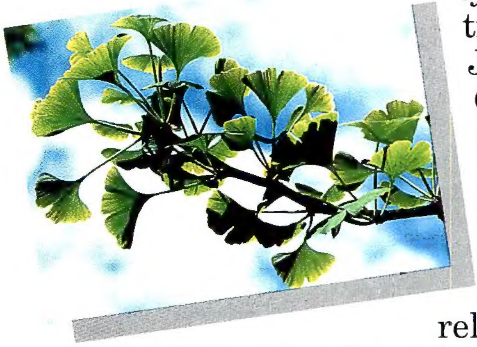
Seed-ferns flourished through the early part of the Dinosaur Age, as dinosaurs spread and multiplied, and ate them. Many seed-ferns had fern-like fronds, but some had fronds which looked like hair. These plants died out before the dinosaurs disappeared. There are none left now.



The first seeds appeared during the Jurassic Period. Like seeds today (above left), each one had its own food store which helped it to grow roots and shoots. Plants that lived earlier, such as ferns (top right) made new plants from the spores which grew on the back of their leaves (above right).

CYCADS

Cycads were very successful throughout the Age of the Dinosaurs. They looked like palm trees. Each one had a stem like a tree trunk and fern-like fronds fanning out from the top. Their pollen blew from one cycad to another, and their seeds grew in large cones. Some cycads still survive today.



The ginkgo tree (below) is a living fossil.

LONE SURVIVOR

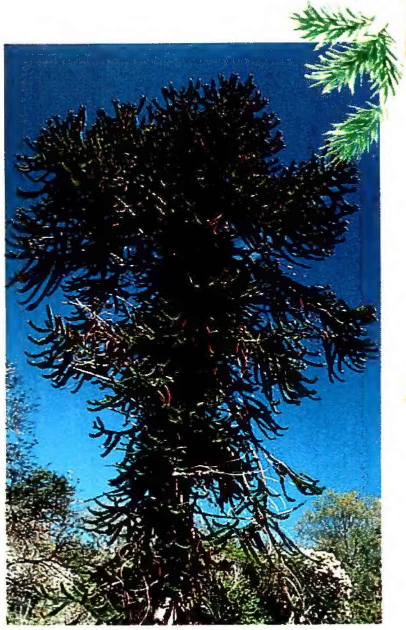
Dozens of different types of ginkgo trees grew in Jurassic forests. Only one type survives today. It is almost exactly the same as its prehistoric relatives. This 'living fossil' is called the ginkgo or maidenhair tree. Ginkgos have fan-shaped leaves which sprout from dumpy side-shoots along the branches. If you stand under a ginkgo tree, you can pretend you are back in the Age of the Dinosaurs.

THE COMING OF CONIFERS

People often say that dinosaurs ruled the land during the Jurassic Period. They may have been the animal rulers. But another group ruled the plant world – the conifers. Conifers are trees that have cones. We know them today as pines, firs, spruces, larches and many other types. They evolved from trees related to ginkgos, about 300 million years ago.

CONIFER HEYDAY

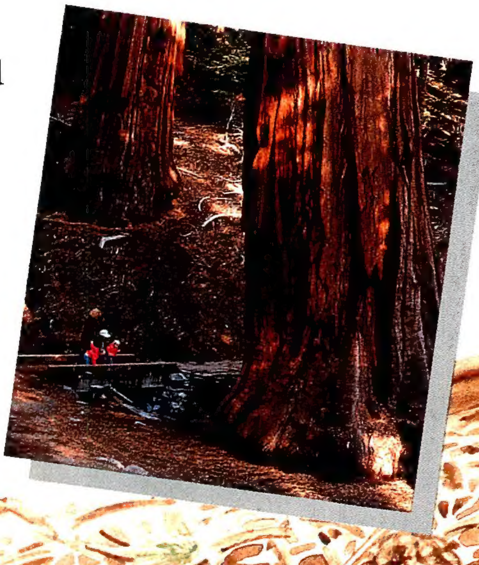
During the Jurassic Period enormous forests of pines, monkey-puzzle trees, yews and cypresses spread across the horizon. They provided food and shelter for countless dinosaurs. Several preserved dinosaurs have been found with fossil stomachs containing the sharp, needle-like leaves of conifers. Can you imagine endless meals of pine needles?



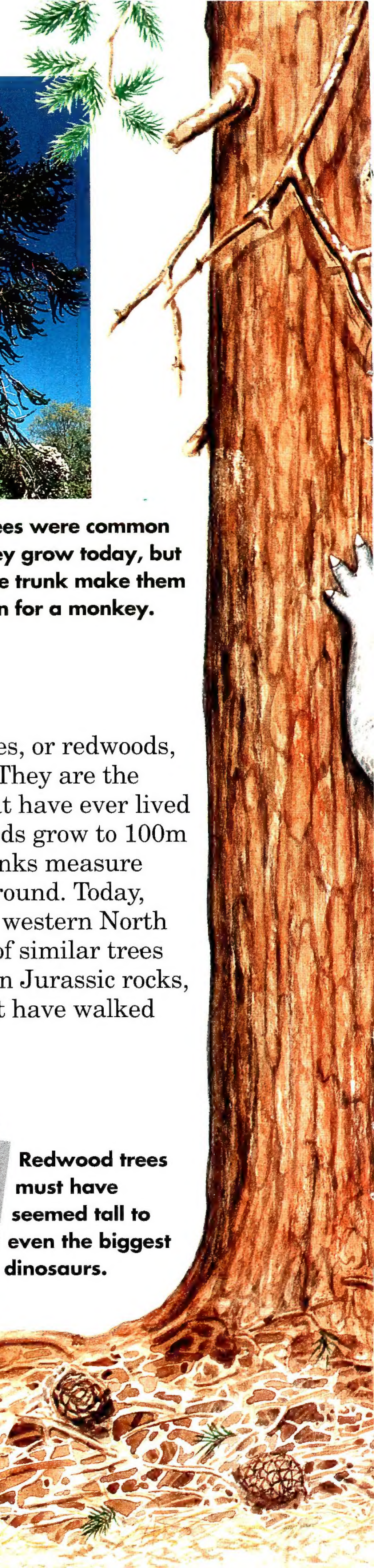
Monkey-puzzle trees were common in the Jurassic. They grow today, but spiky leaves on the trunk make them hard to climb, even for a monkey.

GIANTS

Giant sequoia trees, or redwoods, are also conifers. They are the biggest things that have ever lived on Earth. Redwoods grow to 100m tall, and their trunks measure more than 10m around. Today, they grow only in western North America. Fossils of similar trees have been found in Jurassic rocks, so dinosaurs must have walked among them.

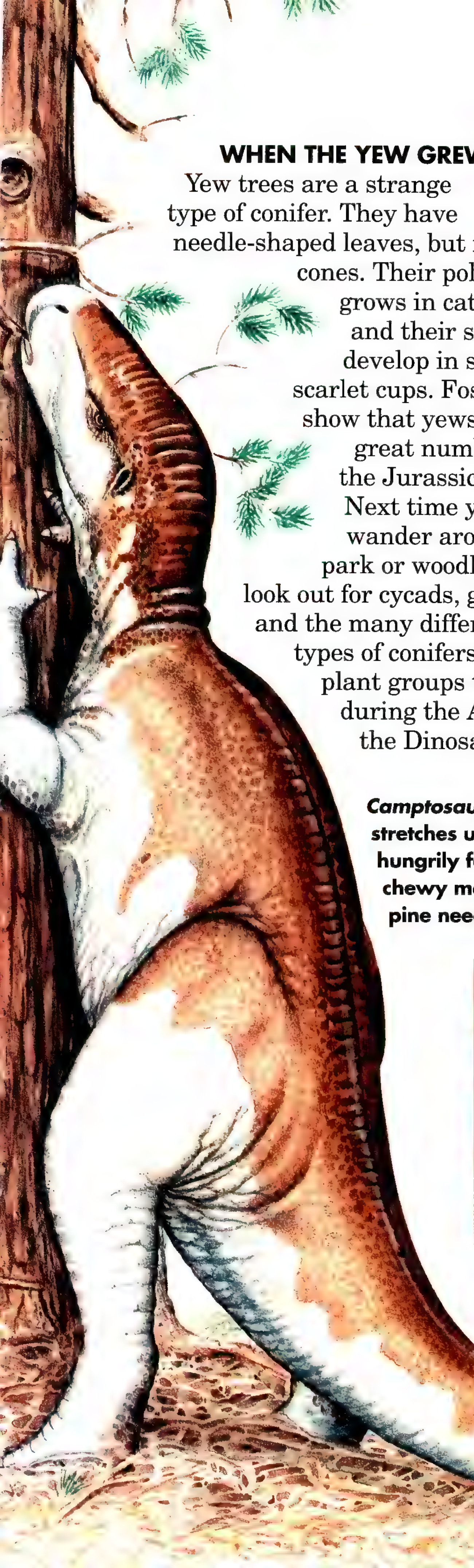


Redwood trees must have seemed tall to even the biggest dinosaurs.



WHEN THE YEW GREW

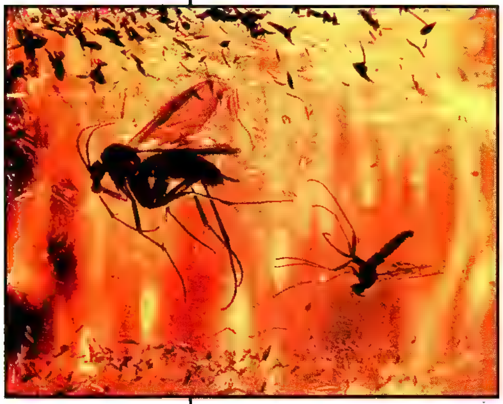
Yew trees are a strange type of conifer. They have needle-shaped leaves, but no cones. Their pollen grows in catkins, and their seeds develop in soft, scarlet cups. Fossils show that yews grew in great numbers in the Jurassic forests. Next time you wander around a park or woodland, look out for cycads, ginkgos, and the many different types of conifers. These plant groups thrived during the Age of the Dinosaurs.



***Camptosaurus* (left) stretches up hungrily for a chewy mouthful of pine needles.**

Yew trees (above) have been around for millions of years. The trees we see today may be as much as 3,000 years old. The bright red berries (inset) are beautiful, but poisonous.

What is? AMBER

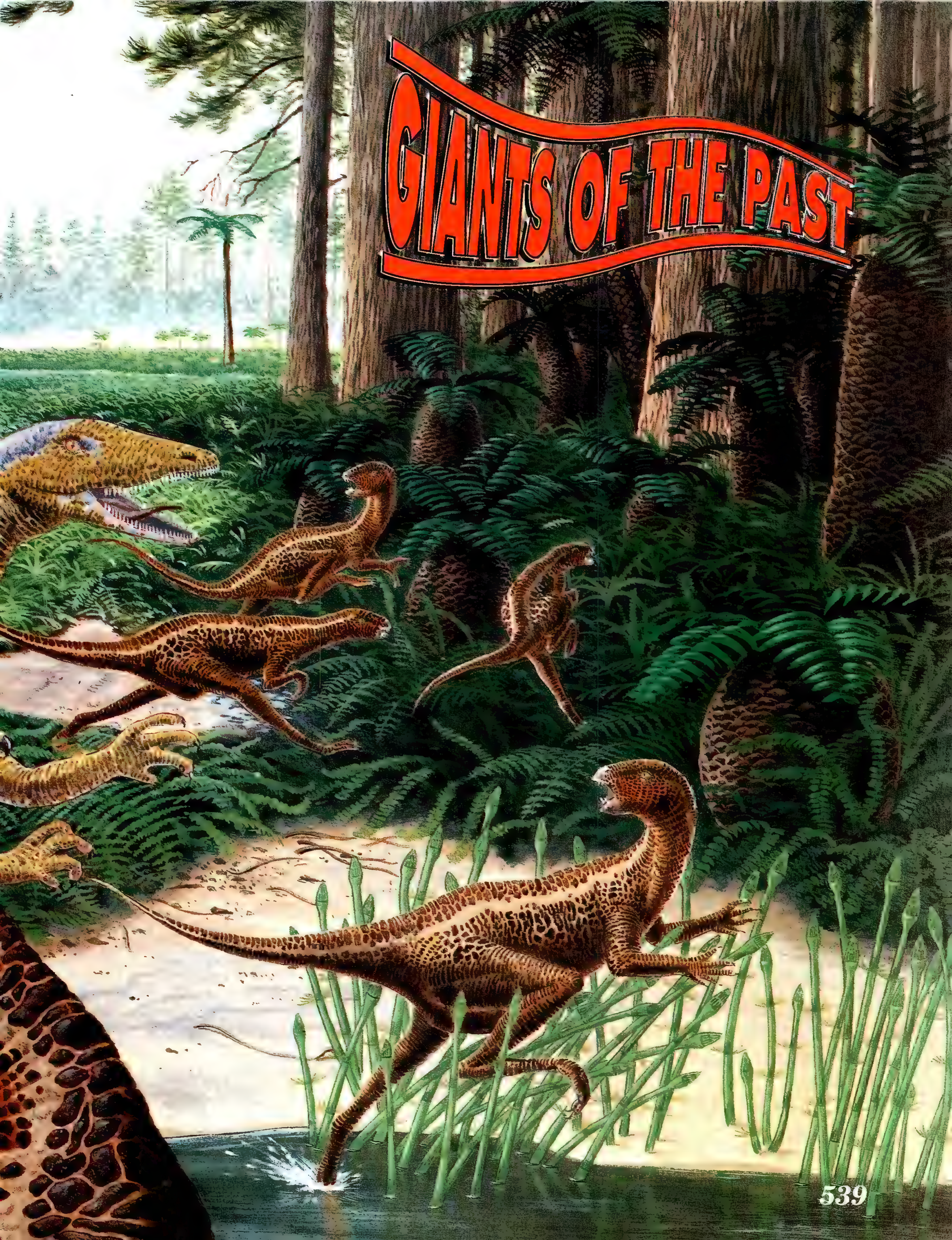


The golden, glassy substance called amber is fossilized resin. This is the sticky substance that oozes from a tree when its bark is damaged. When you cut your skin, blood oozes out, then clots, and forms a scab that seals the wound. Resin does the same for a tree. Conifers are especially good at making resin. A hungry dinosaur may have bitten through the bark of a pine tree. Resin oozed out where the bark was cut, and formed a sticky blob. This became fossilized and turned to amber. Amber sometimes contains the fossils of insects which were trapped millions of years ago in the sticky resin.

HETERODONTOSAURUS

Five peaceful *Heterodontosaurus* are taken by surprise as they drink from a waterhole. A pack of vicious *Coelophysis* charge over the hilltop and launch a sudden attack on the plant-eaters. Some *Heterodontosaurus* run into the thick undergrowth for cover. Some dash into deep water in the hope of escaping the meat-eaters' deadly claws and teeth.

GIANTS OF THE PAST



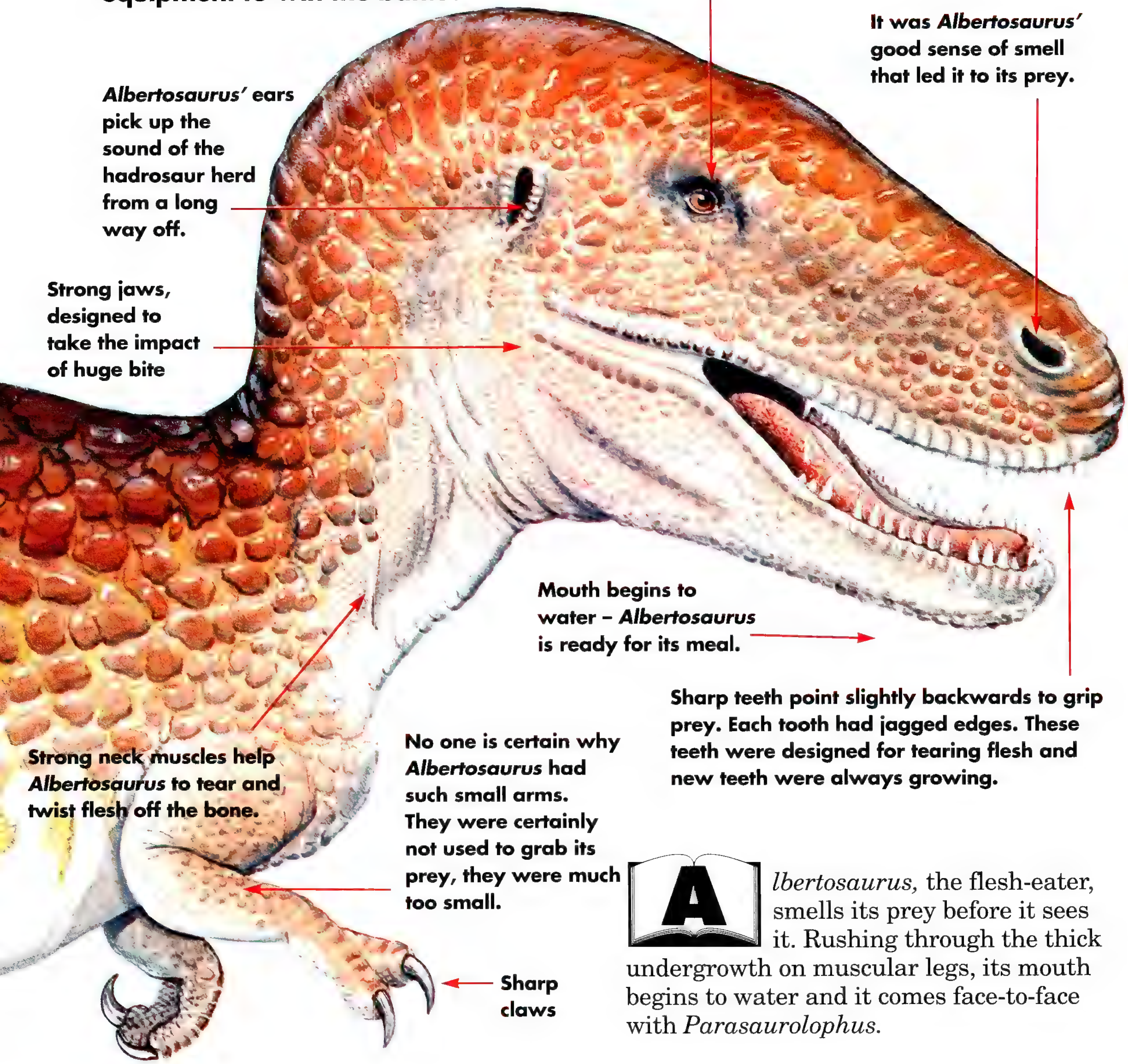
3-D Gallery 32

MUTTABURRASAURUS

- Duckbilled dinosaur
- Lived 107 – 99 million years ago in the Mid Cretaceous Period in Australia
- Measured 7m long
- Ate plants

Meat-eater versus plant-eater

When meat-eater met plant-eater on the plains of North America, 70 million years ago, who had the equipment to win the battle?



Albertosaurus

Eyes focus on victim

It was *Albertosaurus'* good sense of smell that led it to its prey.

Albertosaurus' ears pick up the sound of the hadrosaur herd from a long way off.

Strong jaws, designed to take the impact of huge bite

Mouth begins to water – *Albertosaurus* is ready for its meal.

Sharp teeth point slightly backwards to grip prey. Each tooth had jagged edges. These teeth were designed for tearing flesh and new teeth were always growing.

Strong neck muscles help *Albertosaurus* to tear and twist flesh off the bone.

No one is certain why *Albertosaurus* had such small arms. They were certainly not used to grab its prey, they were much too small.

Sharp claws

Albertosaurus, the flesh-eater, smells its prey before it sees it. Rushing through the thick undergrowth on muscular legs, its mouth begins to water and it comes face-to-face with *Parasaurolophus.*

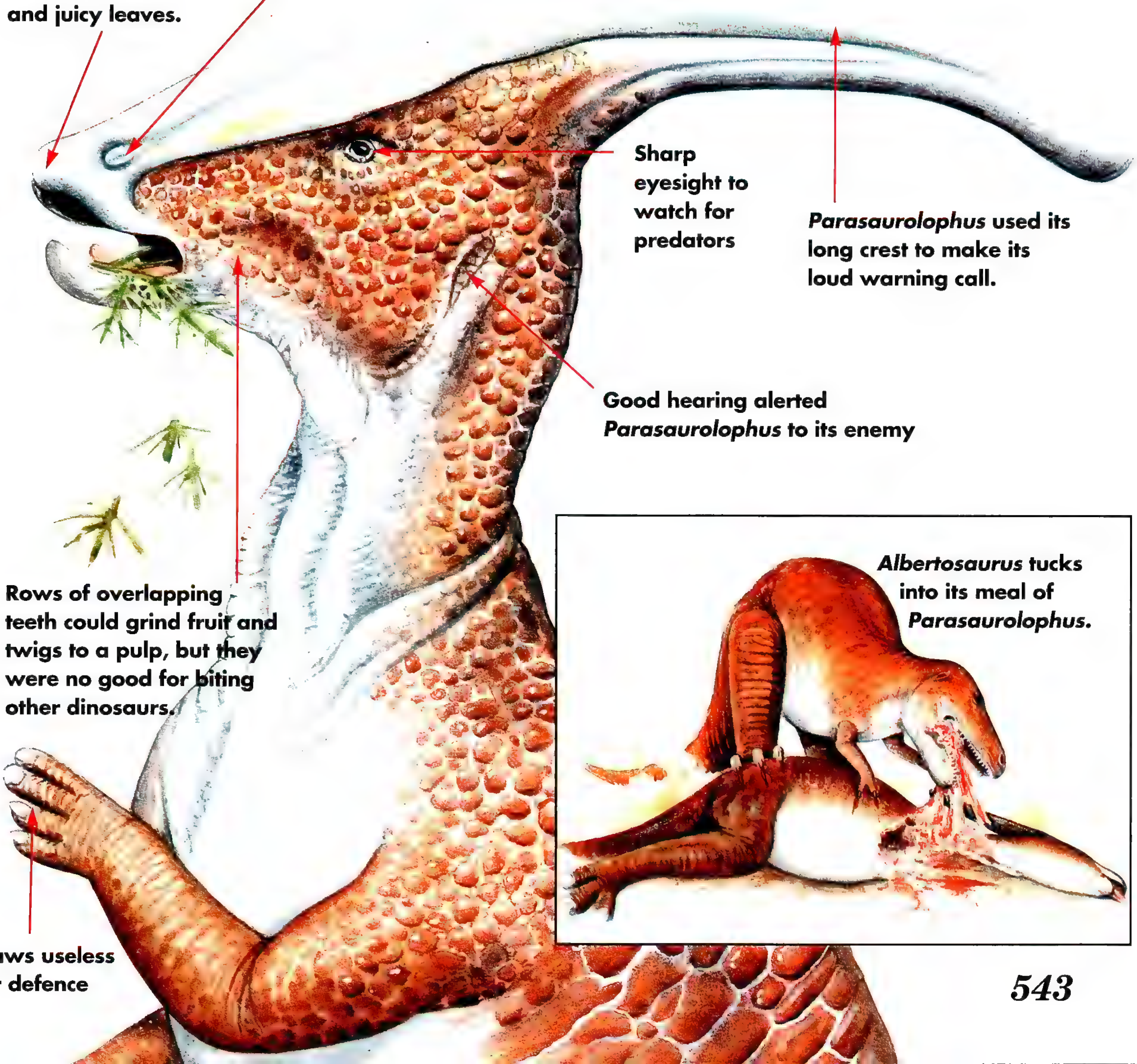
THE OPPONENT

Out in the open, *Parasaurolophus* browses lazily on a clump of horsetails. The rest of its herd are either dozing in the sun or browsing on other plants. Suddenly, *Parasaurolophus* drops its food in surprise. It has picked up the sound of *Albertosaurus* charging through the bushes and raises the alarm.

THE OUTCOME

As the two dinosaurs clash, the rest of the herd scatters. What will the outcome be? *Parasaurolophus* is so surprised that it drops the horsetails it was eating. Although this duckbilled dinosaur was alerted to the attacker, it does not have enough time to react. In this case, *Albertosaurus* is the winner.

Parasaurolophus



Duckbill with horny covering used to nip at tough branches and juicy leaves.

A good sense of smell

Sharp eyesight to watch for predators

***Parasaurolophus* used its long crest to make its loud warning call.**

Good hearing alerted *Parasaurolophus* to its enemy

Rows of overlapping teeth could grind fruit and twigs to a pulp, but they were no good for biting other dinosaurs.

Claws useless for defence

***Albertosaurus* tucks into its meal of *Parasaurolophus*.**

Dinosaur diets

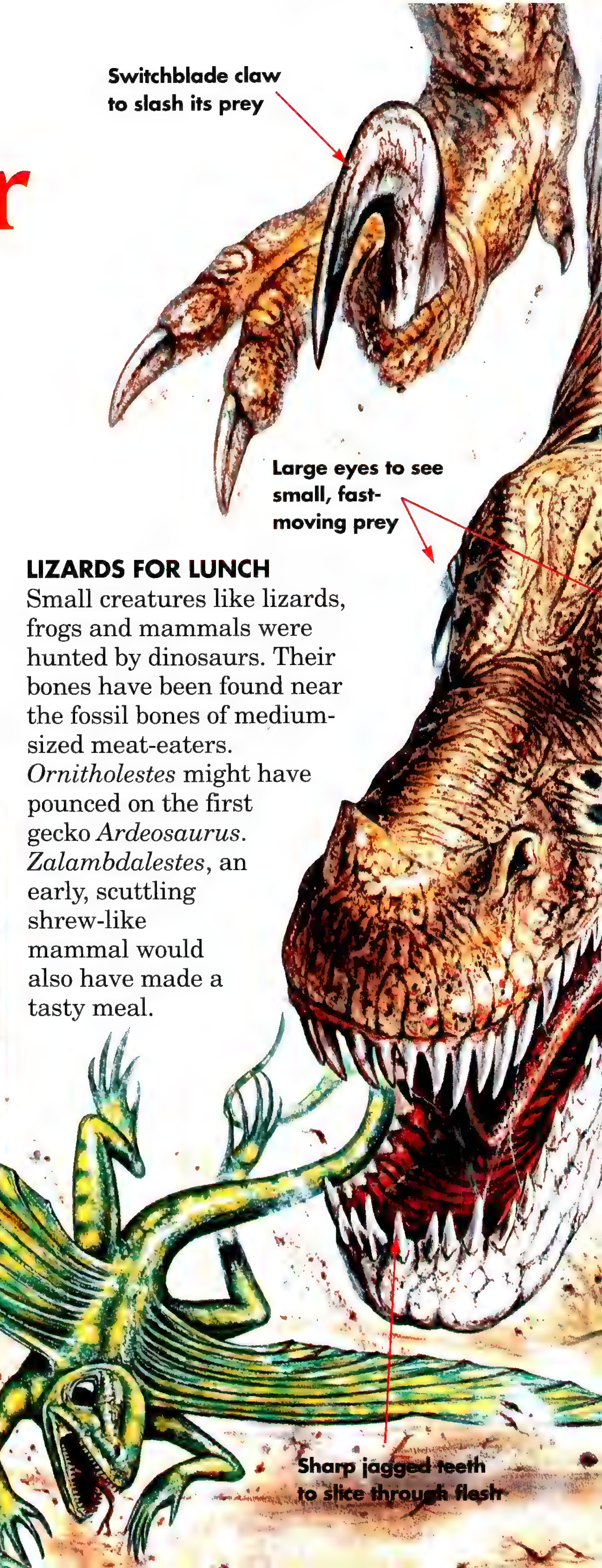
Small creatures were the main food of some of the fastest and fiercest medium-sized meat-eating dinosaurs.

Dinosaurs that ate small creatures had to move quickly to catch their prey. They must also have needed keen eyesight, good hearing and a sharp sense of smell. Some were armed with terrible hooked claws, used to slash the small scuttling creatures that were their prey.

Today's secretary bird (below) behaves in much the same way that small hunting dinosaurs probably did millions of years ago. It sprints after lizards and frogs on its long muscular legs.

LIZARDS FOR LUNCH

Small creatures like lizards, frogs and mammals were hunted by dinosaurs. Their bones have been found near the fossil bones of medium-sized meat-eaters. *Ornitholestes* might have pounced on the first gecko *Ardeosaurus*. *Zalambdalestes*, an early, scuttling shrew-like mammal would also have made a tasty meal.



Switchblade claw to slash its prey

Large eyes to see small, fast-moving prey

Sharp jagged teeth to slice through flesh

FROG FEAST

Medium-sized dinosaurs could also have feasted on the first true frogs. Some of the most agile might even have grabbed small pterosaurs as they glided slowly along.

FAST AND FIERCE

The most frightening medium-sized hunter was *Velociraptor*. It was a two-legged meat-eater from the Cretaceous Period. It had long arms with grasping, clawed fingers. But *Velociraptor's* most deadly weapon was a single mighty claw on each of its hind feet. The claw could be flicked forward for attack, like the switchblade of a knife.

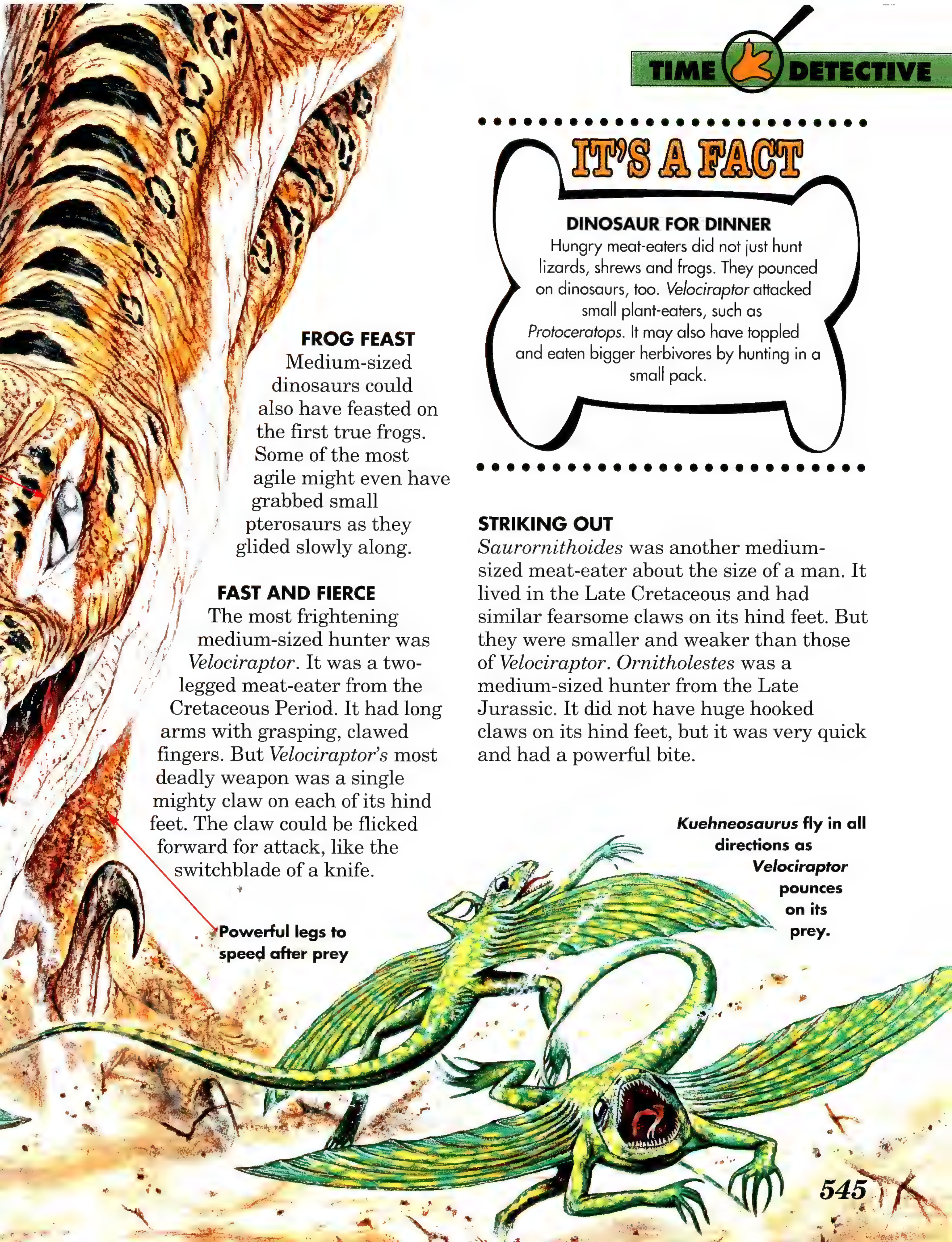
IT'S A FACT

DINOSAUR FOR DINNER

Hungry meat-eaters did not just hunt lizards, shrews and frogs. They pounced on dinosaurs, too. *Velociraptor* attacked small plant-eaters, such as *Protoceratops*. It may also have toppled and eaten bigger herbivores by hunting in a small pack.

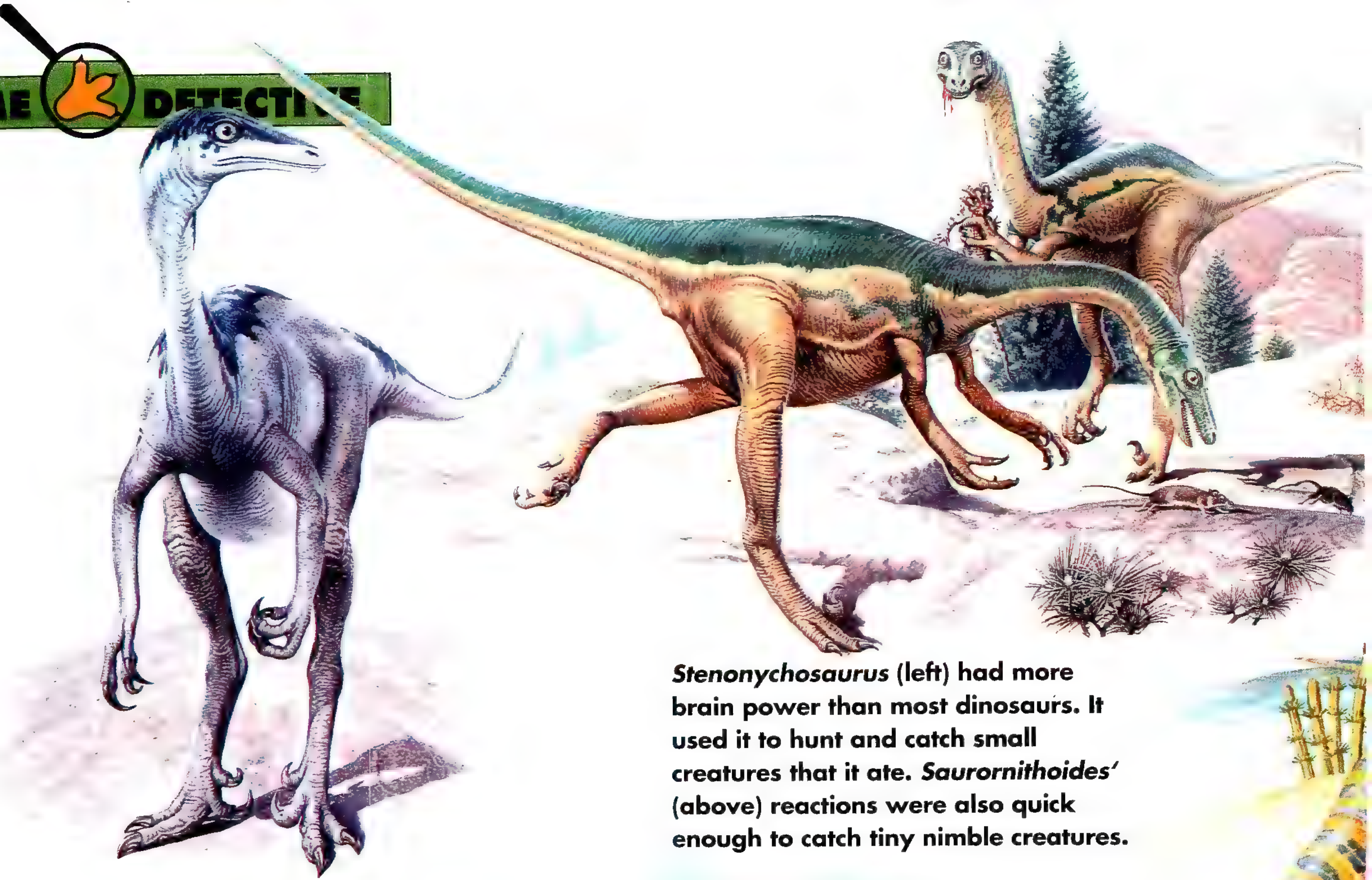
STRIKING OUT

Saurornithoides was another medium-sized meat-eater about the size of a man. It lived in the Late Cretaceous and had similar fearsome claws on its hind feet. But they were smaller and weaker than those of *Velociraptor*. *Ornitholestes* was a medium-sized hunter from the Late Jurassic. It did not have huge hooked claws on its hind feet, but it was very quick and had a powerful bite.



Powerful legs to speed after prey

Kuehneosaurus **fly in all directions as** ***Velociraptor*** **pounces on its prey.**



***Stenonychosaurus* (left) had more brain power than most dinosaurs. It used it to hunt and catch small creatures that it ate. *Saurornithoides'* (above) reactions were also quick enough to catch tiny nimble creatures.**

BRAINS NOT BRAWN

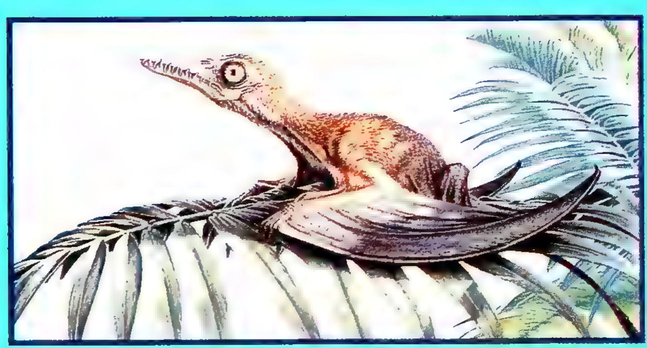
Saurornithoides and *Troodon* were two medium-sized meat-eaters with extra large brains. Experts think they may have been some of the most intelligent dinosaurs. Their brain size probably meant that their sense of sight, sound and smell was highly developed. They may also have had quicker reactions than other dinosaurs. They would have needed all these things to be successful hunters.

DEATH AT DUSK

Both dinosaurs hunted lizards and small mammals. They had long grasping hands and very large eyes. Their eyes pointed forwards which meant that they could concentrate on their prey. Some of the most deadly hunters today, the big cats such as lions and tigers, have forward-pointing eyes. Because the dinosaurs had big eyes, they were probably able to see when it was dark. So they could have hunted animals that were active at night, as well as during the daylight hours.

SLIPPERY CUSTOMERS

Tracking small, darting creatures like lizards needs special skills because they are expert at blending into the landscape. Some have eyes that can see all around, so it is hard to take them by surprise. Lizards alive today, such as geckos, can escape by scuttling up trees and clinging upside down. Lizards that lived at the same time as the dinosaurs were also difficult to find and catch.



Pterosaurs like *Sordes* made a good meal for an agile dinosaur, such as *Stenonychosaurus*.

When *Coelophysis* (below) was alive, rivers, lakes and ponds teemed with fish, frogs and snails. Large numbers of *Coelophysis* may have waded on the edges of lakes and rivers fishing for food, rather like modern water birds.

PACK ATTACK

One exciting dinosaur dig uncovered more than 100 *Coelophysis* at Ghost Ranch in New Mexico. So they probably moved around in large numbers and they may have hunted together in packs. Groups of *Coelophysis* could have preyed on small plant-eating dinosaurs, such as *Heterondontosaurus*. or *Lesothosaurus*

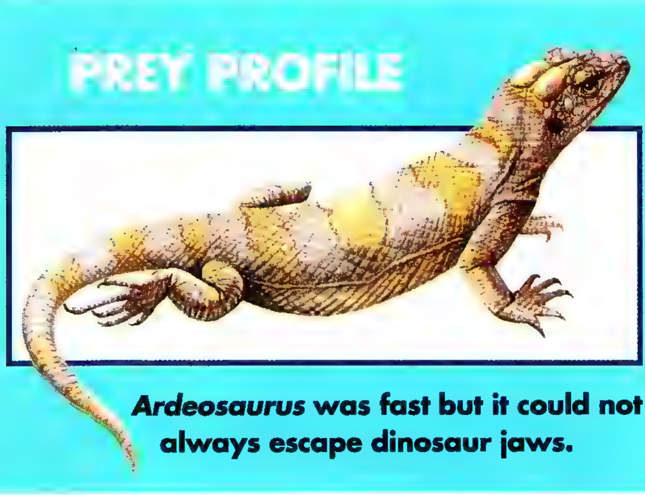
EATING THEIR OWN

Coelophysis not only hunted other dinosaurs. It probably ate its own young, too. Fossilized bones of very small *Coelophysis* have been found inside larger ones. The evidence points to *Coelophysis* being a cannibal. When there was plenty of food about, the dinosaurs probably lived together peacefully. But in hard times, when there was a sudden shortage of small creatures or other dinosaurs to eat, members of the herd may have attacked and eaten the youngest of the *Coelophysis* in order to survive.

SKILLED HUNTER

Coelophysis hunted lizards and possibly frogs and fish, but it lived much earlier and was more primitive than the medium-sized meat-eaters. At 3m long it was also larger than most of them. Was it large enough to eat other dinosaurs?

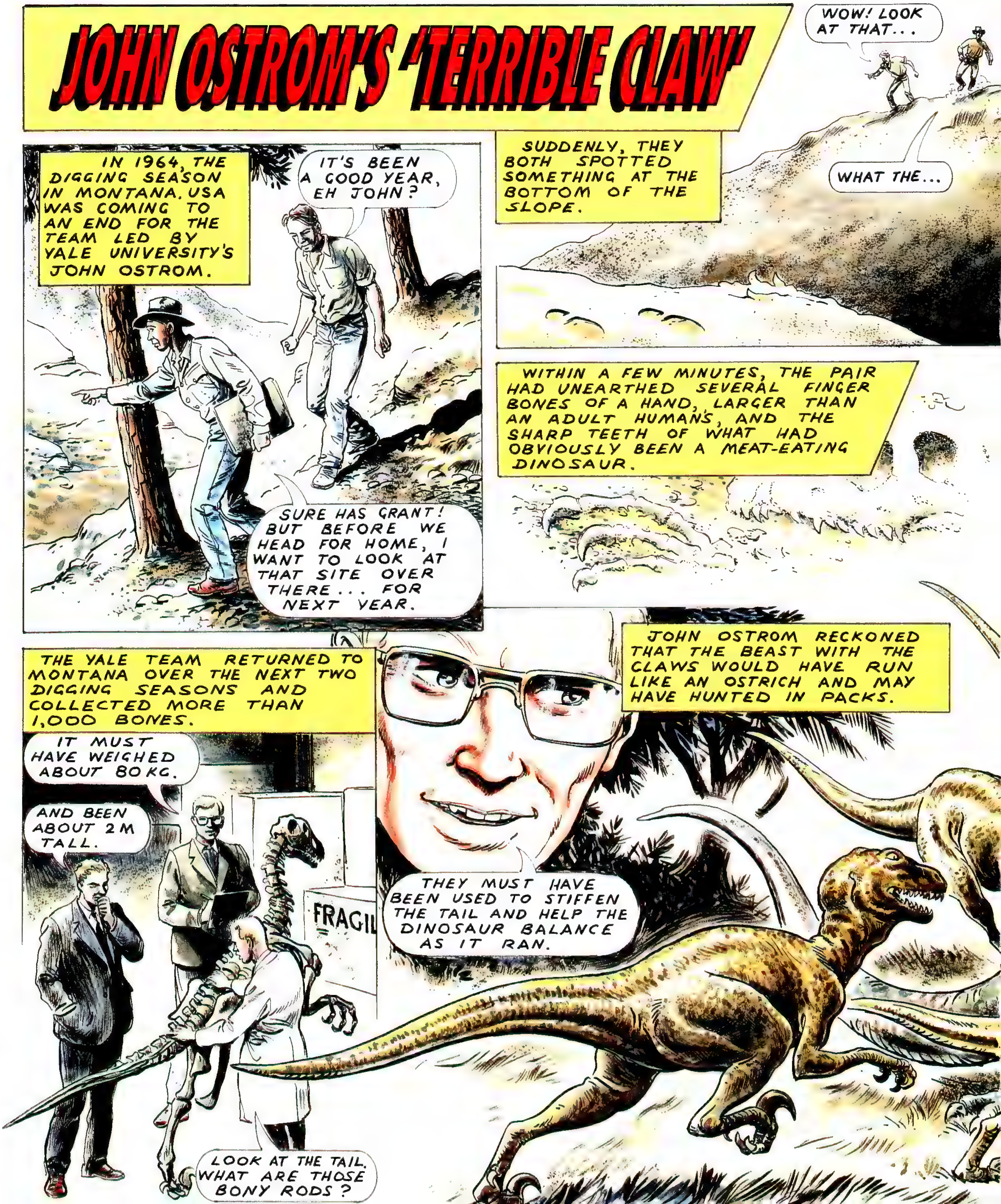
PREY PROFILE



***Ardeosaurus* was fast but it could not always escape dinosaur jaws.**

***Megazostrodon* scuttled in the undergrowth to hide from large-eyed dinosaurs.**

JOHN OSTROM'S 'TERRIBLE CLAW'



IN 1964, THE DIGGING SEASON IN MONTANA, USA WAS COMING TO AN END FOR THE TEAM LED BY YALE UNIVERSITY'S JOHN OSTROM.

IT'S BEEN A GOOD YEAR, EH JOHN?
SURE HAS GRANT! BUT BEFORE WE HEAD FOR HOME, I WANT TO LOOK AT THAT SITE OVER THERE... FOR NEXT YEAR.

SUDDENLY, THEY BOTH SPOTTED SOMETHING AT THE BOTTOM OF THE SLOPE.

WOW! LOOK AT THAT...
WHAT THE...

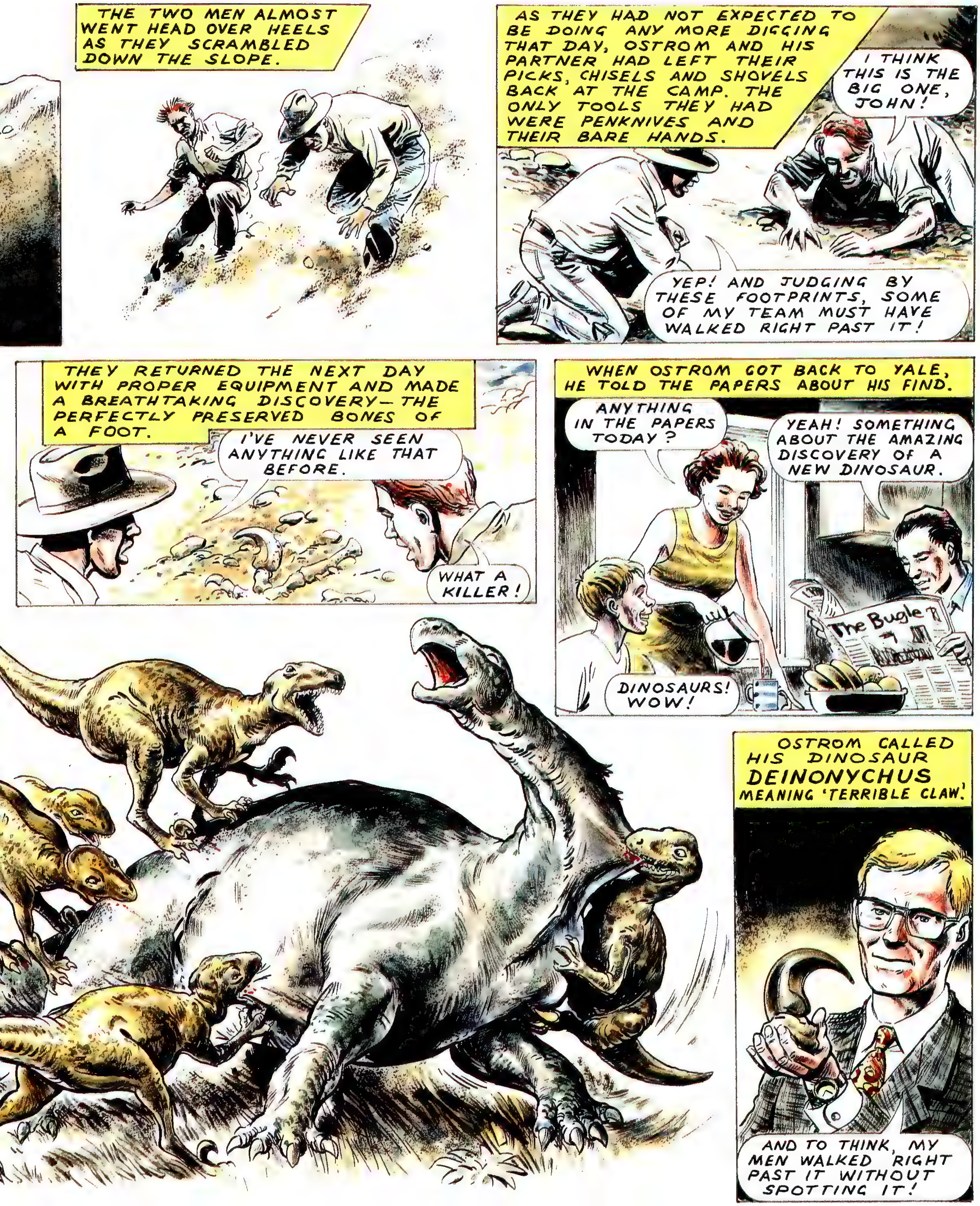
WITHIN A FEW MINUTES, THE PAIR HAD UNEARTHED SEVERAL FINGER BONES OF A HAND, LARGER THAN AN ADULT HUMAN'S, AND THE SHARP TEETH OF WHAT HAD OBVIOUSLY BEEN A MEAT-EATING DINOSAUR.

THE YALE TEAM RETURNED TO MONTANA OVER THE NEXT TWO DIGGING SEASONS AND COLLECTED MORE THAN 1,000 BONES.

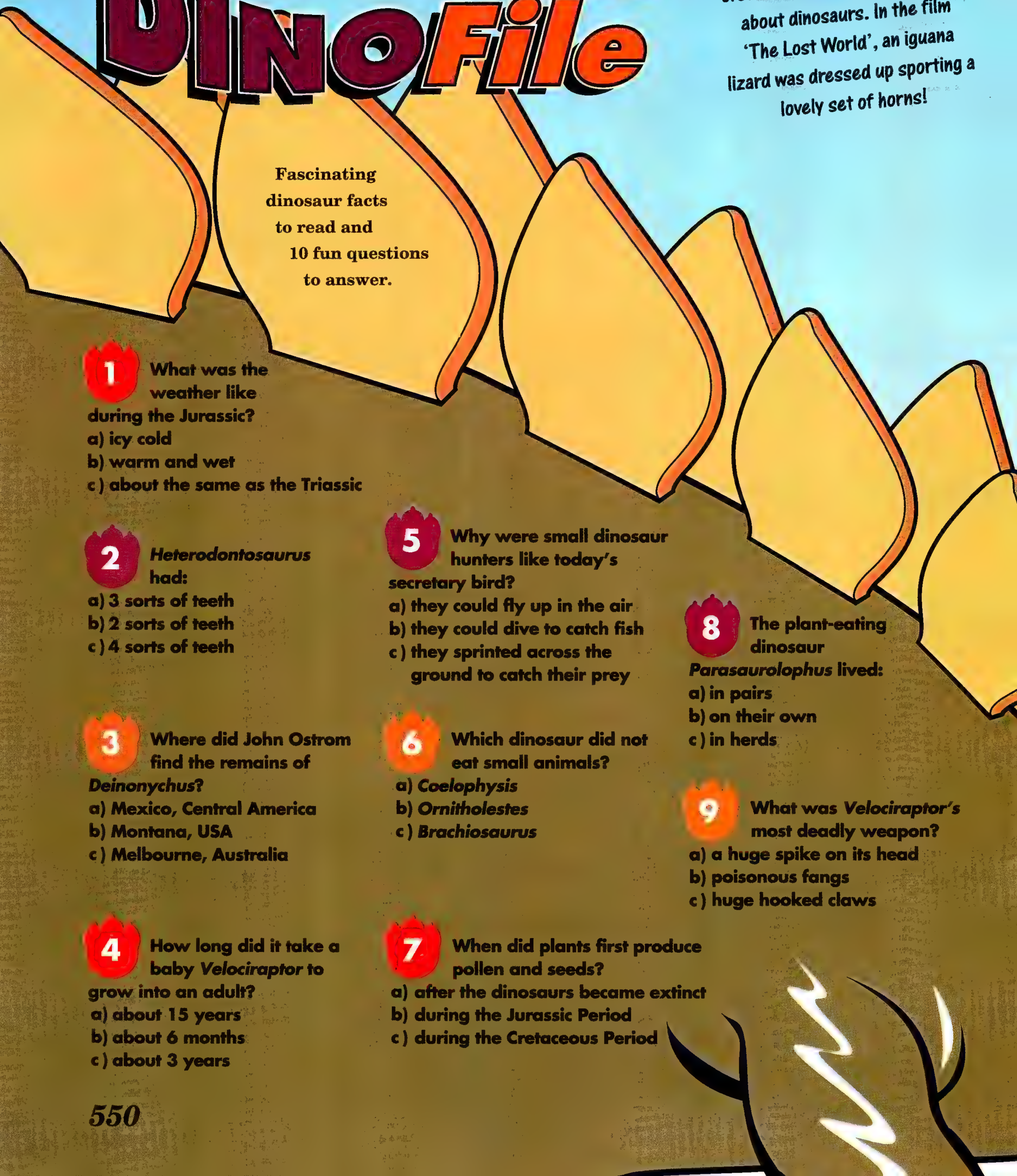
IT MUST HAVE WEIGHED ABOUT 80 KG.
AND BEEN ABOUT 2 M TALL.
FRAGIL
LOOK AT THE TAIL. WHAT ARE THOSE BONY RODS?

JOHN OSTROM RECKONED THAT THE BEAST WITH THE CLAWS WOULD HAVE RUN LIKE AN OSTRICH AND MAY HAVE HUNTED IN PACKS.

THEY MUST HAVE BEEN USED TO STIFFEN THE TAIL AND HELP THE DINOSAUR BALANCE AS IT RAN.


THE TWO MEN ALMOST WENT HEAD OVER HEELS AS THEY SCRAMBLED DOWN THE SLOPE.
AS THEY HAD NOT EXPECTED TO BE DOING ANY MORE DIGGING THAT DAY, OSTROM AND HIS PARTNER HAD LEFT THEIR PICKS, CHISELS AND SHOVELS BACK AT THE CAMP. THE ONLY TOOLS THEY HAD WERE PENKNIVES AND THEIR BARE HANDS.
I THINK THIS IS THE BIG ONE, JOHN!
YEP! AND JUDGING BY THESE FOOTPRINTS, SOME OF MY TEAM MUST HAVE WALKED RIGHT PAST IT!
THEY RETURNED THE NEXT DAY WITH PROPER EQUIPMENT AND MADE A BREATHTAKING DISCOVERY— THE PERFECTLY PRESERVED BONES OF A FOOT.
I'VE NEVER SEEN ANYTHING LIKE THAT BEFORE.
WHAT A KILLER!
WHEN OSTROM GOT BACK TO YALE, HE TOLD THE PAPERS ABOUT HIS FIND.
ANYTHING IN THE PAPERS TODAY?
YEAH! SOMETHING ABOUT THE AMAZING DISCOVERY OF A NEW DINOSAUR.
The Bugle
DINOSAURS! WOW!
OSTROM CALLED HIS DINOSAUR DEINONYCHUS MEANING 'TERRIBLE CLAW.'
AND TO THINK, MY MEN WALKED RIGHT PAST IT WITHOUT SPOTTING IT!

DINO Fact File



Fascinating dinosaur facts to read and 10 fun questions to answer.

Movie stars

Early film directors used very creative methods to film movies about dinosaurs. In the film 'The Lost World', an iguana lizard was dressed up sporting a lovely set of horns!

1 What was the weather like during the Jurassic?

a) icy cold
b) warm and wet
c) about the same as the Triassic

2 *Heterodontosaurus* had:

a) 3 sorts of teeth
b) 2 sorts of teeth
c) 4 sorts of teeth

3 Where did John Ostrom find the remains of *Deinonychus*?

a) Mexico, Central America
b) Montana, USA
c) Melbourne, Australia

4 How long did it take a baby *Velociraptor* to grow into an adult?

a) about 15 years
b) about 6 months
c) about 3 years

5 Why were small dinosaur hunters like today's secretary bird?

a) they could fly up in the air
b) they could dive to catch fish
c) they sprinted across the ground to catch their prey

6 Which dinosaur did not eat small animals?

a) *Coelophysis*
b) *Ornitholestes*
c) *Brachiosaurus*

7 When did plants first produce pollen and seeds?

a) after the dinosaurs became extinct
b) during the Jurassic Period
c) during the Cretaceous Period

8 The plant-eating dinosaur *Parasaurolophus* lived:

a) in pairs
b) on their own
c) in herds

9 What was *Velociraptor's* most deadly weapon?

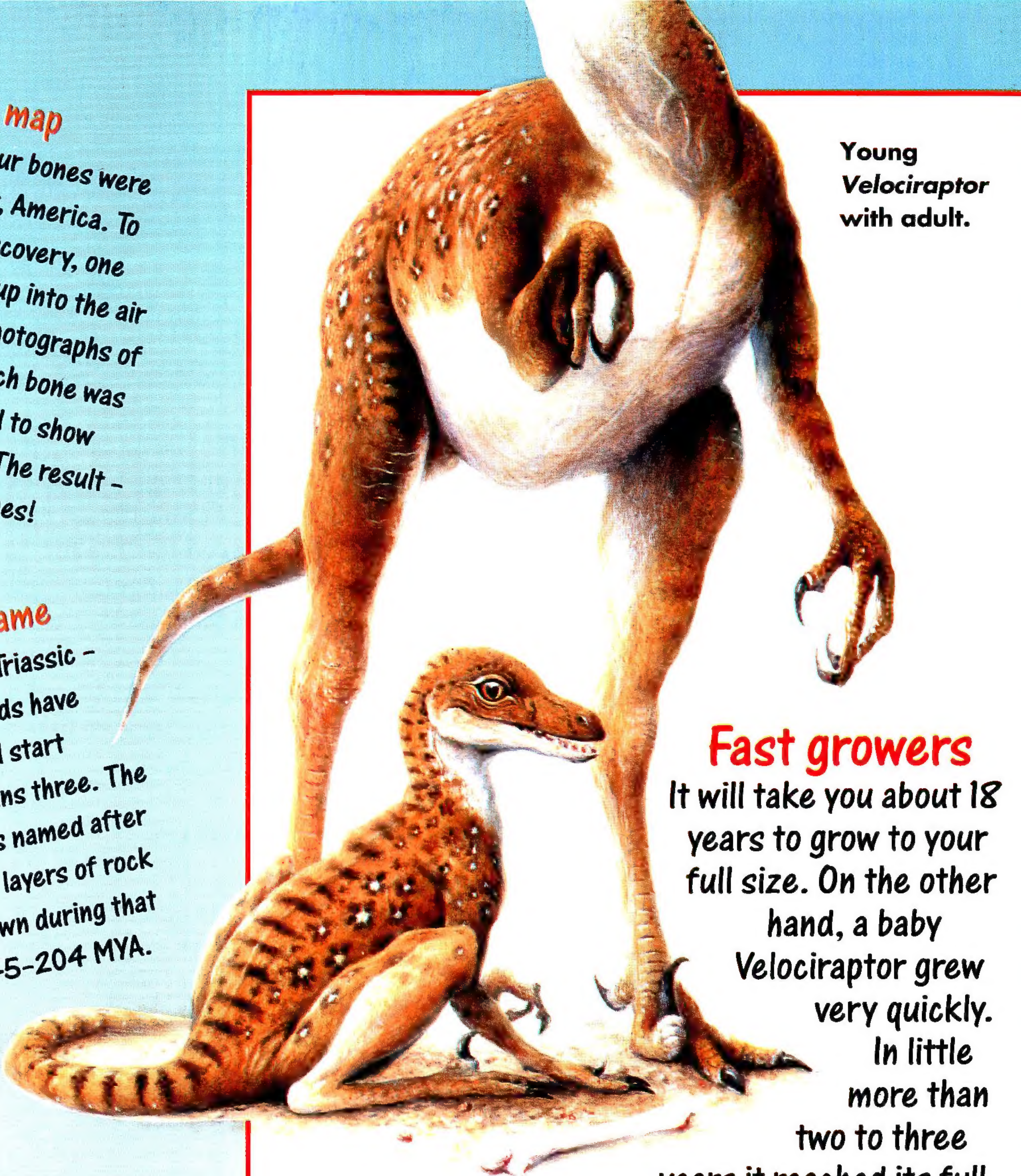
a) a huge spike on its head
b) poisonous fangs
c) huge hooked claws

Dinosaur map

In 1934, huge dinosaur bones were found in Howe Quarry, America. To make a map of the discovery, one person was hoisted high up into the air in a large barrel to take photographs of the bones below. Then each bone was carefully drawn on a grid to show exactly where it was found. The result – a map of dinosaur bones!

What's in a name

Triangle, tricycle and Triassic – what do all these words have in common? They all start with 'tri', which means three. The Triassic Period was named after the three distinct layers of rock that were laid down during that period of time 245-204 MYA.



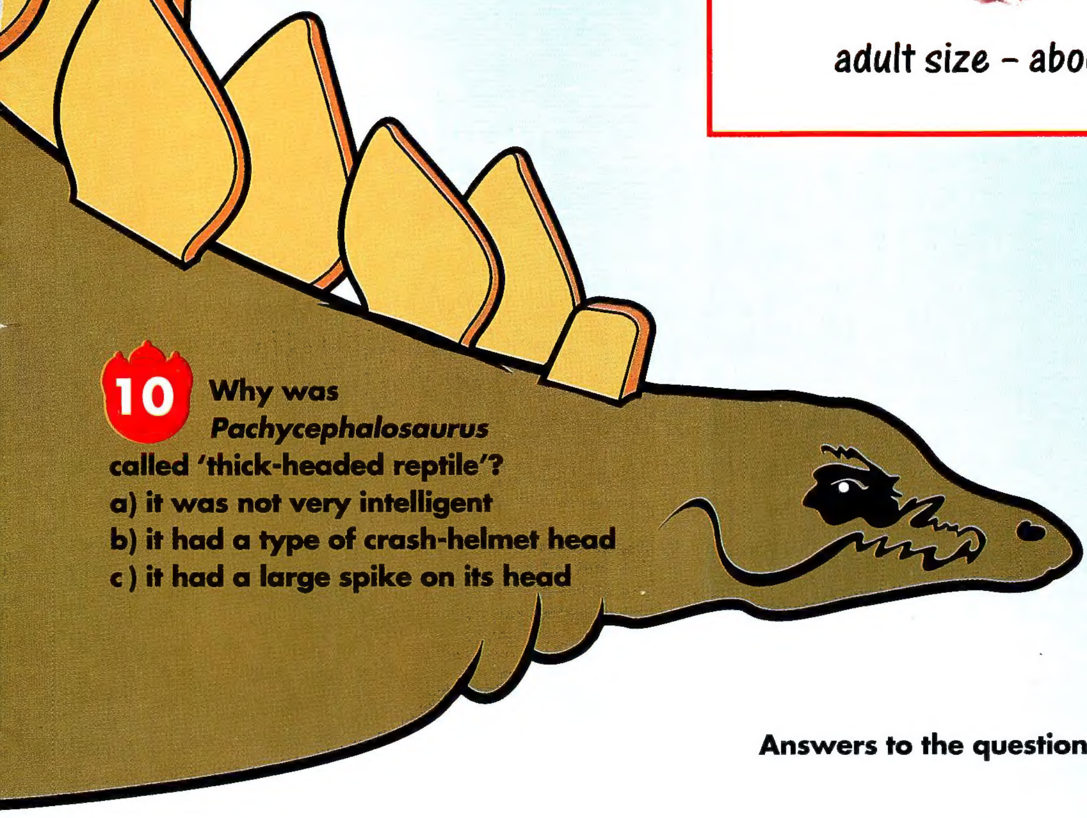
Young *Velociraptor* with adult.

Fast growers

It will take you about 18 years to grow to your full size. On the other hand, a baby Velociraptor grew very quickly. In little more than two to three years it reached its full adult size – about the size of a large dog.

Back in time

If you stood in a New York street, jumped in a time machine and went back 200 million years to the Early Jurassic Period, you would find yourself in a large lake. On the shores of this lake you would not have found skyscrapers and yellow taxi cabs, but large tree ferns and conifers lining the shores.



10 **Why was *Pachycephalosaurus* called 'thick-headed reptile'?**

a) it was not very intelligent

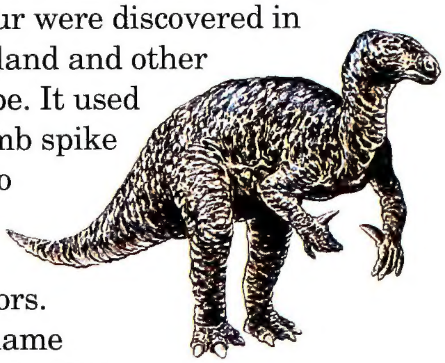
b) it had a type of crash-helmet head

c) it had a large spike on its head

Answers to the questions on inside back cover

IGUANODON 125 MYA

Iguanodon (ig-wa-no-don) was as long as four small cars and taller than a double-decker bus. It could walk on all fours or run on its strong hind legs. *Iguanodon* was only the second dinosaur to be given a name. Hundreds of skeletons of this big, plant-eating dinosaur were discovered in southern England and other parts of Europe. It used the large thumb spike on its hands to pull down branches or attack predators. *Iguanodon's* name means 'iguana tooth'.



INDOSUCHUS 75 MYA

Indosuchus (in-doh-soo-kus) means 'Indian crocodile'. It lived in the Late Cretaceous Period in central India. *Indosuchus* was a meat-eater with jagged teeth as long as an adult's middle finger. Only parts of this meat-eater's skull have been found, but they show that *Indosuchus* grew new teeth whenever the old ones needed to be replaced. *Indosuchus* was as long as an elephant and walked on two strong legs.

INGENIA 75 MYA

Ingenia (in-ghen-ya) was probably an omnivore – an animal that eats all sorts of food. It lived in the Late Cretaceous Period in south-west Mongolia. *Ingenia* was about as long as a leopard and walked on two legs. This bird-like dinosaur had a toothless beak and curved claws on its hands. It was named in 1981 after Ingeni-Tsav, a place in the Gobi desert, Mongolia.

ISCHISAURUS 210 MYA

One of the oldest known dinosaurs, *Ischisaurus* (isk-ih-saw-rus) lived in north-west Argentina during the Triassic Period. It was about the size of a wolf and chased its prey on two muscular legs. Its name means 'thorn reptile'.

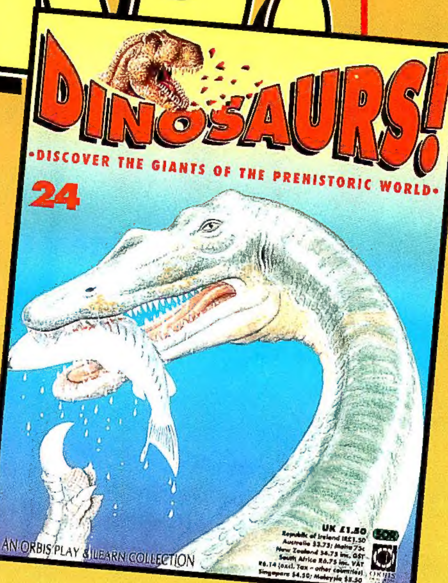
ITEMIRUS 80 MYA

Itemirus (eat-em-ee-rus) was an agile, meat-eating dinosaur. It was named after the place where its braincase was found in 1976. This was Itemir in the Kyzylkym Desert of central Asia. *Itemirus* may have had good balance and keen eyesight. It was probably a small dinosaur which could run fast on two legs.

MYA = MILLION YEARS AGO

COMING IN PART 24 OF

DINOSAURS!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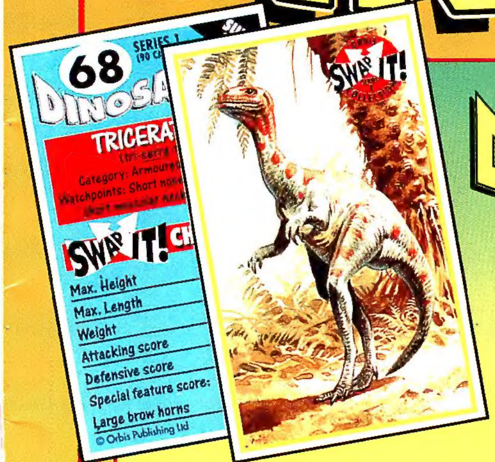
Learn all there is to know about huge meat-eating *Baryonyx* in IDENTIKIT. Find out which Cretaceous flowers dinosaurs could have seen in DINOSAUR WORLD.



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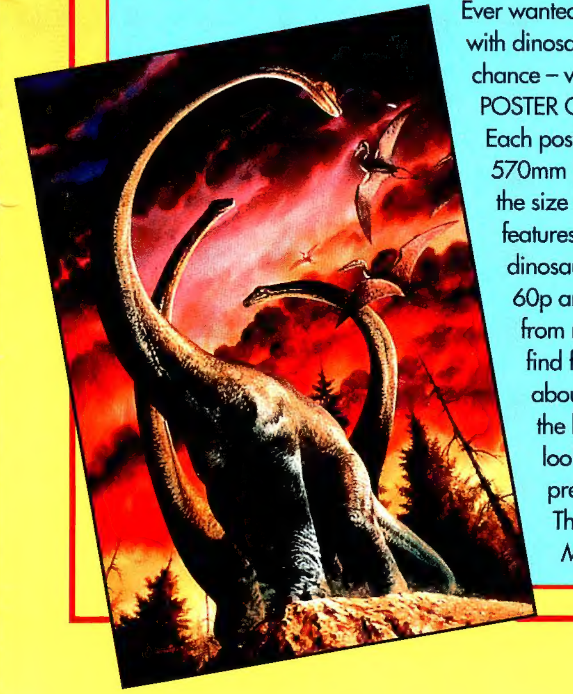

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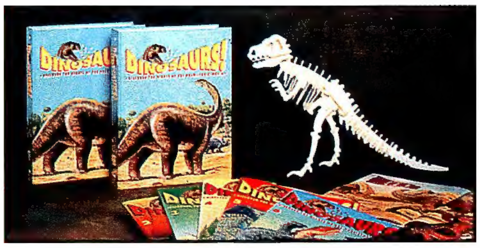

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Dr. David Norman of Cambridge University answers your dinosaur questions

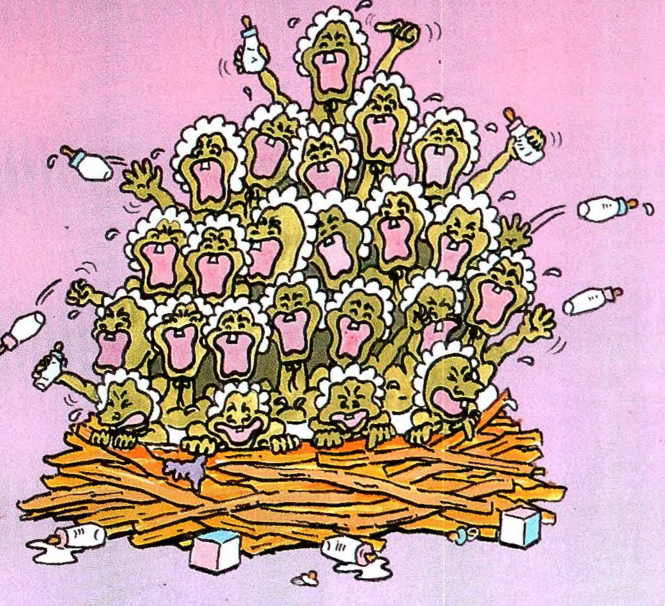
ASK THE EXPERT

Could dinosaurs swim?

Most dinosaurs could swim, in the same way that horses and elephants and dogs can swim today. Many dinosaurs had rather light bodies so they may have floated extremely well. However, no dinosaurs swam all the time – none developed flipper-like legs or a long paddle-like tail.

How many baby dinosaurs would there be in a nest?

The number of young produced by living animals varies. It ranges from one or two at a time, as in humans, to several million, as in many fish. Some dinosaur nests have been found, which give us an idea of how many young were produced by different dinosaurs. For example, *Protoceratops* laid 12 eggs or more.

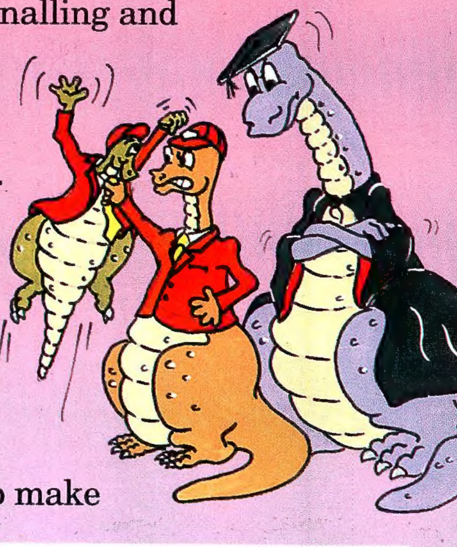


Could a group of dinosaurs have killed a T rex?

Most modern animals avoid trouble if they can. It is true, however, that various small birds of different species will group together to attack a meat-eater, such as an owl or a hawk. We will never know for certain if this happened with dinosaurs, but I guess it may have.

Could a dinosaur signal to other dinosaurs if it was in trouble?

Yes! Hadrosaurs which had large crests on their heads may have done this. Crests were used for signalling and may have been brightly coloured to attract attention. The crest also allowed the hadrosaur to make a loud bellowing noise. Young dinosaurs would have been able to make calls which would attract the attention of their parents.



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